NOTES 3/3/69 HAEUSSERMANN

1. Redshift Relativity Program. Reference Notes 2/24/69 Haeussermann. The future of the Redshift Relativity Experiment was discussed on February 27 at OSSA. Attendees from OSSA: Naugle, H. Smith, Mitchell, Roman, Ott; from MSFC: Decher, Gregory. Development of the spacecraft hydrogen maser clock at Smithsonian Astrophysical Observatory (SAO) will be supported by OSSA with SRT funds until a final decision concerning the flight experiment is made. A proposal for a hydrogen maser satellite with several scientific objectives (in addition to a redshift measurement) will be submitted by SAO in about six months. This proposal will provide the basis for a decision concerning the future of the Redshift Experiment.

2. Supporting Research. Preliminary guidelines from OART indicate that MSFC will not receive any SRT funds in the areas of Control Systems and Communications. Instead, increased funding was provided for telescope technology and optical communication and tracking. While we are very pleased about the OART support in optical technology, we are very much concerned about excluding MSFC completely from the SRT Programs for control systems and microwave communication.

3. Goddard X-ray Telescope. Extensive computerized ray traces have been performed on the Goddard X-ray telescope (SO56). Ray traces for a point source response have been completed and ray traces for line sources and extended sources are underway. Elaborate measuring and testing of SO56 flight hardware are also underway. These tests consist of making photographs of Air Force resolution charts with the SO56 telescope. This is accomplished in the optical region of the spectrum by projecting the image of the resolution chart by means of a collimator thus illuminating the SO56 optics. The photographs are processed by means of a precision microdensitometer in order to quantitatively determine the resolution and image quality. These measurements are being performed both on axis and off axis. The off axis samples range over the total field of view and will allow experimental determination of the total image quality. The experimental results will be compared to the theoretical results of the ray trace to determine the extent of image degradation from aberrations. This work is being accomplished by in-house personnel from the Astrionics Laboratory.

Nancy -
I would like to mail this web with Drs Haeussermann & Johnson - probably separately -
Jean

DRAFT

March 14, 1969

Dr. von Braun:

In answer to your specific question as to any suggestions, I believe there are some general things we can do; however, after looking into this situation, there is nothing that can be done immediately to reinstate the support for the control systems and microwave communications. We find ourselves in a position that Frank Sullivan in OART has a very limited budget and is faced with a growing center in ERC, both in numbers and increasing capability, which he has to support. With this combination, he has decided to place most of his electronic work at ERC, and at the Astrionics area limit our work to the supporting technology program.

According to Bill Johnson, Jim Elms has built up a very capable group of people at ERC and has set about doing many tasks in-house at the component level rather than letting large contracts. By doing this, he is able to offer Sullivan much more for his money than apparently we are able to offer. I get the idea that ERC may be working more in the "skunk works" mode. ERC is becoming quite active in the optical area; therefore, if we are not extremely careful, we may find ourselves in the next few years in the same position in this field as we do in the electronics area today.

One suggestion I would like to make is that you have a personal discussion with Brooks Moore in the near future to go over how you see Astrionics, performing in the future, what types of jobs they should be looking

for; and in what mode the laboratory should be run. I think this change in leadership offers a good opportunity to re-evaluate not only the tasks Astrionics is performing, but also the mode in which they do their work.

JTS

(+)

The following is our record in the S&C area.

FY	requested	received
67	450K	230K
68	280K	140K
69	200K	0 (initially we were to receive 75K – These funds were reprogrammed to Optical Technology)

In the microwave communications area the exact figures are not readily available, but the trend has clearly indicated "0".

NOTE TO DR. WEIDNER March 13, 1969

Subject: Loss of OART support for MSFC activities in Guidance and Control and Microwave communications

This is in response to your note of March 10, 1969, to me on this subject. In answer to your specific questions, I do not know of any action which would tend to change the OART position in these areas.

The loss of funding support appears to be a natural consequence of the build-up of capability in ERC, changes in the research objectives of OART to increase emphasis on guidance and control for aeronautical systems, and RTOP's; an attempt to better compartmentalize their research programs in order to better control the use of their funds to meet more broadly stated research objectives than it was possible to meet under the concept of individual task management.

Historically, in the G&C area, in FY-67 we requested about $450k in support and received about $230k. In FY-68, the work identified for their support was about $280k and the final funding was about $140k. In FY-69, we identified about $200k worth of work initially and were provided an original guideline of $75k. In a reprogramming action, that money was withdrawn to make available funding to support the optical technology activity.

In the microwave communications area it is somewhat harder to unscramble the actual support figures; however, the trend above (i.e., support decreasing more rapidly than the over-all decrease in OART support to the Center) is repeated. The trend of the support has for some time clearly projected "0"; except for some possible small, individually approved tasks.

I have had numerous discussions with Frank Sullivan over the course of the past three years dealing with program planning and the necessity of maintaining broad contacts in the electronics area between this Center and his subprogram elements. While it was apparent that Frank recognized the advantages of such participation on the part of the Center, he has been faced with a money problem. His budget has declined with the over-all decline of the OART budget. However, the competences available to him, and requiring support from his program, at ERC have continuously increased. As a consequence, these two program areas in particular finally reached the point where our role was too small. Our approved work consisted of one or two individual tasks. These were approved largely by personal agreement

between the Center and Frank's individual subprogram managers. They did not really represent essential parts of an over-all planned OART program activity. On several occasions, Frank expressed concern that this resulted in a situation which made management difficult. With the introduction of the RTOP, he has moved to correct it. His position is clearly spelled out in his letter of December 20, 1968, to me (copy attached). You will note that his letter is in specific response to a letter which I had written to him on December 4, 1968, a copy of which is also attached. Prior to sending my letter, I had proposed attempting to negotiate with OART a somewhat lower level of support in the optical area in an attempt to keep in the G&C and microwave communication systems areas. It was concluded that the best course was to accept the offer of increased funding for optics.

Under the circumstances, I cannot seriously question his decision with respect to the FY-70 guideline. I discussed this matter with him prior to issuance of the informal guidelines which we have received. He has available to him almost no acceptable alternative. I am of the opinion that an official reclame would probably not result in a reversal of the decision. In fact, I am not sure that to approach him again, even on a more personalized basis, would not prove somewhat irritating.

William G. Johnson

2 Enc:
As stated

Dr Johnson

DEC 12 REC'D 8

8. ep/file

cc: Dres

TRIP REPORT

VISIT AT ERC, DECEMBER 4, 1968

The topic of discussions between Dr. Fletcher, Mr. Ingrao and myself concerned the Workshop Meeting which OSSA and OART are planning for next spring. SSL has been asked to host this meeting at MSFC. The guiding theme behind this symposium should be the question, "Which problems must be solved now to make space astronomy successful?" Chairmen for the individual groups will be selected by OSSA and OART. It is intended to have these groups discuss technical problem areas, and to suggest solutions, during the Workshop Meeting. A summary report will be written by members of Headquarters. ERC offered contributions in the areas of optical and environmental testing of telescope systems.

Dr. Van Atta described plans for an optical technology satellite ground station on Mount Hopkins, south of Tucson, Arizona. The first experiment will concern the scintillation of arriving light beams from stars, and the determination of water vapor content of the atmosphere by observing the sun and the moon with multi-frequency infrared sensors. The Mount Hopkins station will also be used to try out active optics systems (segmented mirror systems). ERC offered to us the facilities on Mount Hopkins for our own astrophysical and astronomical ground testing work.

Optical laboratory work which I saw during my visit included diffraction pattern observations of a variety of telescope spiders, masks, and segmented mirror patterns (Dr. Hubert Tschunko); and electro-optical control of servo-controlled segmented mirrors with real-time interference pattern sensors (Dr. Stephen Habajanek).

ERC is planning to build a vertical optical test facility of about 10 meters height for optical testing of mirrors up to three meters (120 inches) diameter. Again, ERC offered MSFC the use of this test equipment as soon as it is completed.

Ernst Stuhlinger

Ernst Stuhlinger

cc:
DIR, Mr. Shepherd
R-ASTR-DIR, Dr. Haeussermann
R-AERO-DIR, Dr. Geissler
R-EO-DIR, Dr. Johnson
R-ASTR-R, Mr. Taylor
R-SSL-DIR, Mr. Downey
R-SSL-DIR, Dr. Bucher
R-SSL-T, Mr. Heller
R-SSL-S, Mr. Gierow
R-SSL-P, Mr. Hembree

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

December 20, 1968

IN REPLY REFER TO: RE

Dr. William G. Johnson
National Aeronautics and Space Administration
George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

Dear Bill:

I appreciate your comments of December 4, 1968 on our change in the MSFC guidelines. We had the same worries at the time we made the changes and went through a period of soul searching before issuing them. Without going into all the details, I can assure you that we considered the factors you mentioned and feel the approach OART is taking will give center management the latitude to cope with local variables and needs.

One of the concepts we emphasized in our deliberations is the principal mode or feature of the centers' work under the Electronic Systems Program. This approach excludes a number of isolated work units supported, in the past, by Headquarters managers as elements in a program collage. It is my belief these are difficult to justify and harder to manage from either a center or Headquarters viewpoint.

In our judgment MSFC is playing a major role in the Agency's large optics program. It is our intent to support and further this effort with research program authority under Electronic Systems.

As you may know, OART is working on a research management system which has good possibilities of being integrated, in part, in the FY 1970 program. A major feature of the new system involves the use of Research Technology Objectives and Plans (RTOP). These are the equivalent of work statements which formalize the center-Headquarters program commitments and identify the role the center is performing in the OART program. The program changes in FY 1969 are in keeping with the principles embodied in the proposed management system.

Your interest and comments are appreciated, and I trust this letter will give you an insight into our plans and the OART management philosophy.

Sincerely yours,

F.J. Sullivan, Director
Electronics and Control

copies to Dr. Heusserman
Mr. Williams
Mr. Chase
Mr. Miles 12-26-68

R-EO-DIR DEC 4 1968

Mr. Frank J. Sullivan
Code RE
National Aeronautics and Space Administration
Washington, D. C. 20546

Dear Frank:

Attached for your consideration are two task descriptions, Form 1122, of efforts proposed by the Center in the area of optical and telescope technology. One is for the production of an active mirror system which will be used as an element in a breadboard Telescope System to identify and study problems potentially associated with using large, active, diffraction limited optical systems in space. The second is for the production of an Optical Figure Sensor. This is also planned as an element of the breadboard Telescope System.

These two tasks, together with modifications of the Chrysler and Perkin-Elmer efforts already proposed, will use completely the $450,000 increase in guideline, to a total of $650,000, in the 125-22-subprogram cited in your memorandum of October 6, 1968, to Dr. von Braun. Obligational authority in that subprogram was increased by $200,000, to a revised guideline of $400,000 on October 29, 1968. The additional $250,000 authority required to cover the efforts described above has not yet been received.

I have been informally advised of plans currently under consideration to reduce guidelines in other subprograms in a total amount of $235,000. I understand that such reductions are being considered principally for the purpose of making available funds to cover the increased effort planned in optical technology. We certainly recognize the importance of the work in optics and, if such reductions are required to carry out a proper program, we will make the adjustments required in the other areas. However, as you are aware, reductions in funding of programs which the Center is conducting for OART have

already been severe because of overall agency budget cuts, and further reductions could seriously jeopardize our capabilities of conducting a balanced program which effectively contributes to the attainment of OART research objectives. This matter of the Center continuing to participate actively on as broad a base as possible in the OART Electronics Program is, as I have indicated to you on several occasions, a matter of real concern to me. I believe strongly that participation in the program is necessary if we are to be sufficiently knowledgeable to readily and effectively apply the advanced technologies developed. Therefore, I urge you, if it is at all possible to do so, to make available the additional funding required for the work in optics without reducing the support in the other subprograms.

Sincerely,

Original Signed By
William G. Johnson

William G. Johnson

2 Enc:
As stated

cc:
R-AS-DIR, Mr. Williams
R-ASTR-DIR, Dr. Haeussermann
R-EO-R, Mr. Miles

cc:
Code RMS, Mr. Daisey
Code RET, Mr. Meson (shown on courtesy copy only)

OTES

Frank –

Re: your letter of 1 Nov 1968 to Frank Sullivan in response to his letter of Oct 8 –

→ We have received $215,000 new authority from Sullivan

→ We have been informed, informally & verbally, that the current plan for making available the additional $235,000 required to total the $450,000 for OTES is to scrub it out of the MSFC program –

As a part of our response to Sullivan, I wanted to be sure to make the point that OTES is not the highest priority item we are doing in electronics & new work would require new funding – I seem to have lost that option – (see note attached)

Before any further actions are taken toward extending existing contracts or entering into new contracts for other work in this area I want to review w/ Tidd, & Astrionics the plans, potential costs, schedules, etc – I am reluctant to destroy a part of the program already weakened by drains to support ERC to foster activity in what appears to me to be a low probability effort –

Bill

5 Nov 68

To: Hamby / Tidd
Byron

Sent 11/12 [initials]

cy to Johnson – EO

Bill's request is a valid one – Please arrange a meeting ASAP – incl R-EO people & ASTR to cover this complete area – incl expect funding picture – here (MSFC) & Hq ds.

[initials] 11/9

ACTION COPY TO............ DATE..........

INFO Copy (ies) DIR, DEP-T, DEP-A, E-DIR

R-DIR, I-DIR, FIN

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C. 20546

OCT 14 REC'D

action item 10-9

Sus 10-18

R & D Action to: Johnson

Info Copies to: Weidner, Cook, Weaver, Williams, Hoppes, Ballard

Hg. Huermann

IN REPLY REFER TO: RET

OCT 8 1968

10/11

TO : Director, Marshall Space Flight Center

FROM : Director, Electronics and Control Division
Office of Advanced Research and Technology

SUBJECT : Optical technology programs at MSFC

MSFC has been instrumental in providing excellent services in our Optical Technology, both in laser communication and in telescope work. In particular we have been very much pleased with the support MSFC has given us in the Optical Technology Experiments Studies (OTES).

As a result of the withdrawal of AAP funds from the Optical Technology programs, it has become necessary to restructure the 125-SRT program funding plans in order to be able to continue what we consider important baseline projects.

In order to continue this work on an austere basis, funds are being reprogrammed in the amount of approximately $450 thousand from other sources. $200 thousand will be forwarded immediately as an addition to your program 125 guideline and also as new program authority. The remainder of the $450 thousand will be sent as soon as possible. This will permit an immediate redirection of the two present definition contracts with Chrysler and Perkin-Elmer to achieve one definition contract each for optical communication and telescope technology. These contracts are intended to have approximately the same scope as the present definition contracts and to result in reasonable options at several levels of cost, size, and weight with detailed plans for pursuing further work in Phase B (including PAD's).

Part of these funds are also intended for an active optics development contract which will push the state of the art in active optics and at the same time both provide equipment for the MSFC optical configuration simulator and achieve a second qualified source in this difficult and important field.

RECEIVED OCT 11 1968

RECEIVED OCT 11 1968 DIR

Since this program has been underway for some time as an AAP project it is requested that the same technical and programming groups be retained in the revised program to assure no loss of continuity.

This matter has been discussed by telephone with Mr. Frank Williams of Marshall Space Flight Center.

F. J. Sullivan

cc:
RF

Please check with Williams' Office to determine precisely what has been done and let me know. Also, prepare response to Sullivan if required.

Bill 18 Oct

ROUTING SLIP

MAIL CODE	NAME	ACTION	
		APPROVAL	
E-R	Mr. Bethay	CALL ME	
		CONCURRENCE	
		FILE	
		INFORMATION	
		INVESTIGATE AND ADVISE	
		NOTE AND FORWARD	
		NOTE AND RETURN	
		PER REQUEST	
		PER TELEPHONE CONVERSATION	
		RECOMMENDATION	
		SEE ME	
		SIGNATURE	

Subject: Haeussermann's note of 3/3/69 - Supporting Research

Woody:

What we received in program authority for OART Code #125 in the years FY-66 through FY-69 are shown in Columns 1 through 5.

There is no need for alarm on anyone's part as to OART sub-program code numbers and terminology as it is all being converted to RTOP's. "Control Systems" and "Communications" were sub-program line items while "Telescope Technology" and "Optical Communications and Tracking" are new RTOP's. The current OART program and sub-program breaks are being eliminated. Although preliminary FY-70 telcon guidelines are broken out by old sub-programs (Column 6), the tasks

MAIL CODE	NAME	TEL. NO.	DATE

NASA Form 26 JAN 68 PREVIOUS EDITIONS MAY BE USED. GPO : 1968 O—288-167

Research & Technology objectives & Plans - RTOP

ROUTING SLIP

MAIL CODE	NAME	ACTION / APPROVAL
		CALL ME
		CONCURRENCE
		FILE
		INFORMATION
		INVESTIGATE AND ADVISE
		NOTE AND FORWARD
		NOTE AND RETURN
		PER REQUEST
		PER TELEPHONE CONVERSATION
		RECOMMENDATION
		SEE ME
		SIGNATURE

will be included in the new RTOP's (Column 7). Tasks that Marshall wishes to stress in "control systems" or "communications" may be placed within the preliminary RTOP break, or we may create and propose a new RTOP that these tasks will properly fit into. Since we will not submit our FY-70 requirements via #1122 (normally submitted in Mid March) but will submit them within the RTOP structure, we do not have clear cut requirements within the sub-program breaks to compare to Column 6.

MAIL CODE	NAME	TEL. NO.	DATE
E-R	Paul W. Jones	3-1255	3/19/69

NASA Form 26 JAN 68 PREVIOUS EDITIONS MAY BE USED. GPO : 1968 O—288-167

HISTORY
OART ELECTRONICS SYSTEM (CODE #125)

($ in Thousands)

	FY-66	FY-67	FY-68	FY-69		FY-70
	Prog. (1) Auth.	Prog. (2) Auth.	Prog. (3) Auth.	Reqm'ts (4) #1122 Submittal	Prog. (5) Auth.	Prel. (6) G/L
Electronics System (125)	4408	4049	2655	3119	2180	2880
125-17 Guidance Systems	1061	922	667	670	375	400
125-19 Control Systems	332	243	143	195	0	0
125-21 Communications	1055	1143	324	630	400	0
125-22 Tracking & Data Qcq	609	445	457	430	680	1780
125-23 Data Handling & Proc	476	464	389	420	285	250
125-24 Instrumentation	580	485	401	524	340	350
125-25 Electronics & Tech & Compnts	281	347	274	250	100	100

Breakout of FY-70 Requirements by RTOP	FY-70 (7) G/L
1. Guidance Sys. for Orbital Operation & Docking	400
2. Telescope Technology	900
3. Optical Communications & Tracking	750
4. Other items in Tracking & Data Acquisition Area (RTOP Title not specified)	130
5. Items in Data Handling & Processing Area (RTOP Title not specified)	250
6. Instrumentztion for Adv. Launch Environmental Test & Operations	350
7. Items in Electronics Techniques & Components (RTOP Title not specified)	100
	2880

E-R, 3/19/69

3/3/69

[redacted]

FY-70 OART FUNDING GUIDELINES

SUMMARY

CODE	AERO	ASTR	COMP	ME	P&VE	QUAL	SSL	TOTAL
Space Power and Electric Propulsion								800
120-26		-					100	100
-27		50					-	50
-33		200					100	300
-34		350					-	350
Nuclear Rockets								1,200
121-30		160			940		100	1,200
Space Vehicle Systems								3,530
124-07	170	-	-	-	-	-	-	170
-08	450	-	-	200	1,190	-	--	1,840
-09	-	-	-	-	50	-	1,325	1,375
-12	100	-			45			145
Electronics								2,880
125-17	100	300						400
-19	-	-						-
-21	-	-						-
-22	-	1,780						1,780
-23	-	50	200					250
-24	150	150			50			350
-25	-	-				100		100
Aeronautics, SRT								620
126-14				100				100
-61	520							520
Human Factors								700
127-31				200	500			700
Chemical Propulsion								2,575
128-31	175				1,800			1,975
731-11	-				550			550
-14	50				-			50
Basic Research								660
129-03				130	190		130	450
-04	50		160					210
Supersonic Transport								300
720-03					300			300
TOTAL								13,265
	1765	3040	360	630	5615	100	1755	

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

Memorandum

TO Addressees

DATE MAR 7 1969

In reply refer to:
R-EO-R-69-021

FROM Director, Experiments Office
R-EO-DIR

SUBJECT Submission of FY 1970 Requirements for the OART, OSSA, OTDA and OMSF Supporting Research and Technology (SRT) and the Supporting Development (SD) Programs

This memorandum transmits guidelines for use in completing your Research and Technology Resumes (Form 1122) for the FY 70 SRT and SD Programs. Enclosures 1 through 4 listed below provide specific guidelines for the programs sponsored by OART, OSSA, OTDA and OMSF respectively. You are requested to forward your Research and Technology Resumes to this office by March 21, 1969, to the attention of Mr. D. A. Arnold, R-EO-R, Room 700, Building 4200. Please provide the original resumes with one copy of each and a list of the resumes in numerical sequence with your laboratory relative priority indicated.

A new system of documentation for research planning and management will be initiated in FY 1970 for the OART and OMSF (SD) programs while in the OSSA and OTDA areas the Research and Technology Resume (Form 1122) will continue to be the principle mode of documentation. The new system being developed by OART, and modified by OMSF for the Supporting Development programs, will require "Research and Technology Objective and Plan" (RTOP) documents. These documents will be at a Task Area or higher level and will be the principle means of proposing and negotiating an area of research with the corresponding NASA Headquarters Program Manager. The Research and Technology Resumes will continue to be the detail inter-center control documents and these Forms 1122 will also be forwarded to NASA Headquarters for information purposes during the year as specific work is initiated. Your assistance in reviewing and finalizing the RTOP's will be requested before submission to NASA Headquarters. A copy of the new documentation (RTOP) procedures is being forwarded to you for informatinon under separate cover, i.e., Research and Technology Management System Action Plan for Implementation of the OART Program in FY 70, Research and Technology Objective and Plan, and Instruction for preparing Research and Technology Objective and Plan.

William G. Johnson

4 Enc:
1. FY-70 OART Program Guidelines
2. FY-70 OSSA Program Guidelines
3. FY-70 OTDA Program Guidelines
4. FY-70 OMSF Program Guidelines

See page 2

Addressees:
R-AERO-DIR, Dr. Geissler
R-ASTR-DIR, Mr. Moore
R-COMP-DIR, Dr. Hoelzer
R-ME-DIR, Dr. Siebel
R-P&VE-DIR, Mr. Heimburg
R-QUAL-DIR, Mr. Grau
R-SSL-DIR, Mr. Downey

cc:
R-AERO-T, Mr. Murphree
R-ASTR-TA, Mr. Daussman
R-ASTR-T, Dr. Decher
R-COMP-MP, Mr. Bean
R-ME-M, Mr. Holland
R-P&VE-R, Mr. Hill
R-QUAL-T, Mr. Davis
R-SSL-C, Mr. Mathis

FY 1970 OART GUIDELINES

The guidelines listed below are based on the best information available at the present time and were obtained through conversation with the various OART Headquarters SRT managers. The official guidelines letter expected from OART by the end of January has not been received. As stated in the cover memorandum a new requirement for OART sponsored research in FY 70 will be the preparation of Research and Technology Objective and Plan (RTOP) documents. These RTOP's, which are to be specified by OART in individual "Request for RTOP", will be prepared and negotiated individually with the Headquarters Program Managers during the period extending through May.

The Research and Technology Resumes (Form 1122) will provide basic information on a detail level during the preparation of the RTOP's, which will be at Task Area or higher level, and will also serve as the work implementation document for the Center. Also information copies of the Form 1122 are required by OART Headquarters when specific work is started by the Center.

Your Research and Technology Resumes should include all New, Change, Complete or Terminated items as in previous years, however, in your final analysis particular attention should be given to new work to assure that it will be compatible to one of the RTOP areas listed below. It is requested that the laboratory assign a relative priority number to each Form 1122 within a sub-program if FY-70 funds are required. Priorities may be omitted if no funds are requested. Your submission of requirements for FY 70 should be limited to "over-programming" of 10% of the stated guidelines for each sub-program. Specific funding guidelines for your laboratory are listed on the attached sheet entitled "FY-70 Funding Guidelines/Remarks". Also listed are the total guidelines for MSFC in each program and sub-program.

Specific comments relative to the various programs sponsored by OART are given below. Remarks pertinent to an individual laboratory are made on the attachment.

120 Space Power & Electric Propulsion System, SRT

For planning purposes assume an increase in funding as indicated by guidelines. However, the probability of the scope of this program being larger than last year's 200K has not been established. It is presently anticipated that emphasis will continue to be given to the areas of chemical power generation and power distribution and control. New starts should concentrate on problems associated with the development of large solar arrays and orientation drive systems. Specific information on RTOP's that are to be requested of this Center in the 120 Program is not yet available.

Enc. 1

121 Nuclear Rocket Systems, SRT

The Code 121 funding level is estimated to be approximately the same as FY 69 with some possible increase to a minimum of 1.2M. Research proposed should encompass work to be performed in the following Task Areas which have estimated funding as indicated. We anticipate receiving requests for RTOP's in the following areas:

a. Radiation Effects on Materials and Dosimetry (90K)

b. Nuclear Propellant Heating and Stratification (850K)

c. Evaluation of Radiation Resistence of Materials and Equipment in Existent Vehicle Stage Systems in a Nuclear Environment (90K)

d. Study to Determine the Dual Use of a Nuclear Engine-Power Generation Capability (70K)

124 Space Vehicle Systems, SRT

The overall effort in this research area will continue at approximately the same level as in FY 1969 with minor adjustments at the sub-program level. The anticipated funding for FY 1970 is 3.53M A discussion by sub-program follows.

124-07 Space Vehicle Aerothermodynamics

The work in this sub-program will be a continuation of the effort in FY 1969 with a slight reduction due to restricted funding. This effort is anticipated to be funded at 170K and we expect to receive one RTOP for this sub-program:

a. Aerothermodynamic Problems of Launch Vehicles (170K)

124-08 Space Vehicle Structures

This work will be the continuation to two well established areas in cryogenic storage and high frequency dynamics and the development of two new structures areas related to the low cost launch vehicle and the integral launch and recoverable vehicle. Our continuing research in this sub-program which is not in the high frequency dynamics or crygenic storage areas must be reoriented to support the new low cost and reusable type vehicle structures areas. This research effort is expected to be funded at 1.84M and we anticipate requests for the following RTOP's:

a. High Frequency Launch Dynamics (Engine Noise) (600K)

b. Cryogenic Storage (700K)

c. Low Cost Expendable Launch Vehicle Structures (270K)

d. Integral Launch and Reusable Vehicle Structures (270K)

124-09 Space Environmental Factors

Research efforts in this sub-program will experience a decline as compared to FY 1969. The work in "FLuid Behavior in Low g" is to be transferred to and funded by the 124-08 sub-program. Also the work on thermal similitude is to be transferred to MSC. We expect the funding for this research area to be 1.375M and anticipate requests for the following RTOP's:

a. Space Radiation Shielding and Dosimetry (650K)

b. Ground Based Meteor Observations (100K)

c. Meteoroid Impact and Protection (150K)

d. Space Vehicle Thermal Control (425K) Note - any contamination work is to be included in this area.

124-12 Space Vehicle Design Criteria

The work in this sub-program will be a continuation of the prior year effort and the resumption of work on a materials data handbook produced under contracts with Syracuse University during the 1965-66 period. The total funding support expected in this area is 145K and we anticipate requests for the following RTOP's:

a. Structures Design Criteria (45K)

b. Environment Criteria (100K)

125 Electronics, SRT

The principal change in this research area will be the major emphasis being placed on the optical technology work. A corresponding increase in funding support is noted for this area, however, it is also noted that all support in the control systems and the communications areas has been removed. We expect the FY 70 funding support to be 2.88M which is an overall increase compared to the prior year funding. The following four RTOP's have been identified and listed below with three other areas without specific titles:

a. Guidance Systems for Orbital Operations and Docking (400K)

b. Telescope Technology (900K)

c. Optical Communication and Tracking (750K)

d. Other items in Tracking and Data Acquisition Area (RTOP title not specified) (130K)

e. Items in Data Handling and Processing area (RTOP Title not specified) (250K)

f. Instrumentation for Advanced Launch Environmental Test and Operations (350K)

g. Items in Electronics Techniques and Components (RTOP Title not specified) (100K)

126 Aeronautics, SRT

2880

This research will be a continuation or our previous effort in noise studies, instrumentation for Clear Air Turbulence (CAT) utilizing cross-beam and laser doppler techniques, and also the analysis of atmospheric turbulence from FPS-16 Radar/Jimsphere data. A new research area will be to develop fabrication and inspection techniques for composite structures. The funding support for this area is expected to be 620K and we anticipate requests for the following RTOP's:

a. Composites (100K)

b. Operating Environment Instrumentation (520K)

127 Human Factor Systems/Man-Systems Integration

During FY 70 we anticipate an increased effort in the Human Factors research area. In addition to our current efforts work will be directed towards the development of criteria and habitability guidelines for space stations. Our estimated funding support will be approximately 700K as compared to 400K experienced last fiscal year. We expect to receive three requests for RTOP's in the following areas:

a. Habitability Guidelines and Criteria for Space Stations (200K)

b. Maintenance and Assembly of Space Vehicles in Orbit (300K)

c. Man-Machine Criteria for Lunar Surface Mobility Vehicles (200K)

128/731 Chemical Propulsion

The Code 128 funding level is estimated to be approximately the same as that of the current fiscal year. Research proposed should encompass work to be performed in the areas listed below. We anticipate receiving requests for RTOP's in the following areas with estimated funding as indicated:

a. Technology Identification and Test Measurements (100K)

b. Liquid Rocket Thrust Chamber and Injector Design (450K)

c. Feed Systems and Engine Accessories: (Thurbopump feed system components; Thrust vector control (TVC); Material application and component fabrication; Valves and controllers, Pressurized Feed System components) (450K)

d. Propellant Properties and Performance (300K)

e. Combustion and Ignition (475K)

f. Heat Transfer and Fluid Flow Processes (200K)

The Code 731 funding level is estimated to be approximately the same as for FY 69. Effort proposed should encompass work in the following sub-program area with estimated funding as indicated. We anticipate receiving one RTOP request in this sub-program as follows:

a. Hydrogen-oxygen Launch vehicle Engine System (600K)

129 Research, SRT

Effort in this area will continue to be directed towards material research and applied mathematics research. The funding support is expected to be 660K which is a slight decrease when compared to the prior fiscal year funding. We anticipate requests for RTOP's in the following areas:

a. Light Alloys (80K)

b. Properties of Materials for Electronic Applications (25K)

c. Extraterrestrial Materials (60K)

d. Advanced Forming and Processing (130K)

e. Polymers (110K)

f. Orbit Optimal Control and Data Analysis (210K)

g. Surface Physics and Chemistry (45K)

720 Supersonic Transport

Research in this area will be a continuation of the effort funded and initiated in FY 1968 for the evaluation of polymeric sealant materials for advanced aerospace vehicles. We expect to receive 300K in FY 1970 to continue this work and anticipate one request for an RTOP as listed below:

a. Non-structural Polymeric Material Applications (300K)

FY-70 OSSA GUIDELINES

The OSSA Program Submission for FY-70 should generally be in accordance with instructions relative to the OART Program Submission with only a few minor exceptions.

Each laboratory is requested to indicate the priority of their resumes at the work unit level within each program element.

At this time, there is no funding limitation or limit to the number of work units that would be acceptable for review by this office. However, it should be noted that OSSA follows the practice of approving funding on a work unit by work unit basis. Moreover, new proposed studies for FY-70 should be of high scientific worth and be oriented toward providing information of specific interest to the program elements with OSSA.

For your convenience in formulating new work unit proposals for FY-70, the following brief description of activities within OSSA is provided for your review:

PROGRAM 160 - SPACE APPLICATIONS

The Space Applications Program, consists of the following areas of activity:

Space Applications, SRT

- Navigation
  - Navigation/Traffic Control
  - Data Collection Systems
- Communications
  - Advanced Passive Satellites
  - Small Terminal Multiple Access
  - Broadcast Satellites
  - Deep Space Communications
  - Frequency Utilization
- Geodesy
  - Geodetic Spacecraft Technology
  - Requirements and Applications for Geodetic spacecraft Techniques
  - Manned Geodetic System Studies
  - Advanced Geodetic Systems and Technology
- Meteorology
  - Synchronous Meteorological Satellite Systems Development
  - Reserved
  - Meteorological Sensor Requirements and Evaluation
  - Meteorological Satellite Components and System Development

Advanced Systems and Components

Applications Technology

ATS Control Systems

Spacecraft and Capsule System Development

Earth Resources

Disciplinary Program Definition and Data Analysis Capability

Airborne and Ground Data Acquisition

Interdisciplinary Instrumentation Feasibility Research

System Support

Present planning assumes 350K for work underway to be continued.

PROGRAM 180 - LAUNCH VEHICLES

The Launch Vehicle and Propulsion Program is interested in SR&T work involving general applications to future vehicle developments in the area of unmanned missions. Examples of potential work units acceptable for consideration by this program would include advanced studies and data inputs to advanced studies.

This program office will negotiate guidelines for our Center on the basis of proposed work submitted.

LUNAR AND PLANETARY PROGRAM

The Lunary and Planetary Program areas of activity involve the observation and unmanned exploration of the Moon, planets, asteroids and the development of associated spacecraft. Areas of interest are divided into SRT for Sciences and Advanced Technical Development.

185 - SR&T: Science

Proposed work units appropriate for this program may include space chemistry, solar physics, planetology, and planetary atmospheres - to name a few representative examples.

Present planning assumes that 25K will be available to continue work underway.

186 - SR&T: Advanced Technical Development

For the past few years, this Center has participated in this program to help solve sterilization problems associated with development of a typical lander capsule. It is believed that funding for this area will be difficult to obtain for FY-70.

PROGRAM 188 - PHYSICS AND ASTRONOMY

The Physics and Astronomy Program is concerned with the development and operation of spacecraft such as Explorers and Pioneers; and orbiting astronomical, geophysical and solar observatories.

SR&T within this program is generally concerned with the observation of stellar objects, and the scientific disciplines of Astronomy, Ionospheric and Radiophysics, Fields and Particles, and Solar Physics.

Present planning assumes that adequate support will be provided for continuation of work presently underway and for appropriate new starts. Our latest guidelines are for 777K.

PROGRAM 191 - PLANETARY QUARANTINE

The Bioscience Programs Division involves investigations pertaining to exobiology (extraterrestrial life), planetary quarantine (control of contamination), and biology (environmental, behavioral, and physical).

This Division of OSSA has been receptive to work unit proposals from MSFC which are generally oriented toward sterilization technology with regard to protecting a spacecraft from contamination at the time of manufacture (reduction of the biological load) and protection of the spacecraft after heat sterilization up to and including launch and separation.

Present planning assumes that 150K will be available to continue this years work and for new starts that may be formulated.

FY-70 OTDA GUIDELINES

The Office of Tracking and Data Acquisition has indicated general approval of the direction which FY-69 SRT tasks have taken with their emphasis on telemetry data transmission techniques and on-board data handling equipment. In addition, OTDA has specified that studies of the cost effectiveness of applying new techniques to meet support needs may be included in our SRT effort. For example, as part of the FY-69 work unit: Wideband data Transmission (150-22-17-16), a trade-off study of alternatives should be considered if such a study appears to offer aid in planning and lowering implementation costs.

As in the past, preparation of OTDA Program Submission for FY-70 should give first priority to effort directly related to flight mission support. OTDA has indicated increased interest in the optics area, especially as regards optical communication and tracking in space. This fact should be taken into account.

FY-70 support guidelines for the OTDA R&D POP 69-1 are tentatively set at $400K, (ASTR).

Enc. 3

FY1970 OMSF GUIDELINES
(Supporting Development)

The FY1970 Supporting Development Program will be oriented toward the development of prototype hardware that will support the space station, a space shuttle, and a lunar base. The work should be directed towards those systems and components proven feasible by the OART Program and which will attain flight status in the three major areas listed above in approximately five years. Direct support of main line programs will not be provided by Supporting Development, including the continuation of the J-2S engine work.

The new documentation and management system utilizing the Research and Technology Objective and Plan (RTOP) being developed by OART will be adopted by OMSF for the Supporting Development Program with some modifications. Individual written requests for RTOP's specifying objectives, approach, related activity, and funding estimates, as provided by OART, will not be prepared by OMSF. However, a listing of suggested RTOP areas and funding estimates has been provided and is shown below with a total funding level of 7.0M:

01 Structures. (750K)
02 Thermal Control. (250K)
03 Propulsion. (1,250K)
05 Electric Power. (1,000K)
06 Life Support. (750K)
08 Stabilization and Control. (500K)
09 Abort and Safety. (250K)
10 Guidance and Navigation. (750K)
13 Instrumentation. (250K)
21 Manufacturing and Inspection. (750K)
33 Information Management Systems (500K)

The Research and Technology Resumes currently being prepared should update our current program documentation and, where possible, be directed towards one of the potential RTOP areas above. Hence, particular attention should be given new work. Some consideration will be given in FY70 to "carry over" work from the 904 and 905 areas, however, this should be kept to a minimum since only those cases requiring small amounts of additional resources to complete the work during FY70 will be considered.

The overall Supporting Development requirements which we may propose to OMSF Headquarters will be 50% over the 7.0M guideline. This is a considerable increase over our FY69 funding experience in view of the removal of J-2S requirements.

Individual funding estimates by Laboratory will not be made at this time since it is anticipated that our continuing program will be considerably less than the FY70 guidelines with the 50% flexibility. Attached is a revised coding sheet for the 908 Advanced Manned Missions Program.

Enc 4

SUPPORTING DEVELOPMENT

Advanced Manned Missions
908

10 Earth Orbital Missions
20 Lunar Missions
30 Planetary Missions

01 Structural
02 Thermal Control
03 Propulsion
04 Attitude Control Propulsion
05 Electrical Power
06 Life Support
07 Communication
08 Stabilization and Control
09 Abort and Safety
10 Guidance and Navigation
11 Ground Based Flight Control
12 Display
13 Instrumentation
14 Pyrotechnic
15 Landing and Recovery
16 Launch
17 Flight Preparation
18 Check Out
19 Astronaut Equipment
20 Training
21 Manufacturing-Inspection
22 Transportation
23 Astronomy/Astrophysics
24 Physical Sciences
25 Bioscience
26 Atmospheric Science and Technology
27 Selenography
28 Resources Survey and Inventory
29 Communications/Navigation/Traffic Control
30 Biomedical/Behavior
31 Space Operations Techniques
32 Advanced Technology
33 Information Management Systems

CODING STRUCTURE

MTG 1/28/59

BALCH NOTES 3/3/69

B 3/5

MISSION:

S-II-7 - Stage is still undergoing post-static checkout. Transfer from the A-1 Test Stand to the Vertical Checkout Building for accomplishment of spray foam modifications is still planned for 3/15/69. Schedule calls for stage to be ready to ship to KSC on 4/11/69, but additional requirements in connection with accomplishment of spray foam insulation work could cause some delay.

S-II-8 - Stage arrived at MTF on 2/24/69 and was installed in the A-2 Test Stand on 2/25/69. "Power-up" is scheduled for 3/4/69.

S-IC-9 - The static firing evaluation presentation was conducted by Boeing on 2/27/69, with no major anomalies reported. Removal of stage from the test stand is now scheduled for 3/5/69, with shipment to Michoud planned the following day, four days earlier than originally scheduled. Replacement of splice angle plates in the forward skirt will not be accomplished at MTF.

BOMEX - The third meeting of the NASA/BOMEX Advisory Group was held at MTF on 2/19/69 and 2/20/69. BOMEX program status presentations by MTF and ESSA representatives were well received by the attendees.

The "Rainier", first of the five ships participating in BOMEX, docked at Gulfport on 3/1/69 for installation of the Signal Conditioning and Recording Device (SCARD), which is scheduled to start on 3/4/69.

INSTALLATION:

University Affairs - The MSFC/LSU sustaining grant on four candidate tasks has been issued to LSU by the NASA contracting Officer in Washington.

"New-Work" Prospect for MTF - Chrysler Corporation at Michoud has asked for a meeting with us to discuss the prospects of conducting a research task for the Army Ordance Depot at MTF.

NOTES 3/3/69 BELEW

B 3/5

MEETING WITH AIR FORCE PERSONNEL: A meeting with Air Force personnel has been set for March 10-12, at MDAC-ED (St. Louis). The purpose is to discuss Gemini equipment usage for AAP at all sites and to attempt to resolve any conflicts on joint use equipment. Further, we have agreed to discuss configuration control and logistics support. The meeting will be attended by the three Centers involved and attendance will be limited.

EXPERIMENT DEVELOPMENT & INTEGRATION MANAGEMENT: We discussed with MSC the problems and recommended solutions associated with experiment development and integration management. Agreement was reached on combining development and integration meetings, review material and activities, and types of reviews required. Agreement was not reached on combining the Experiment Integration Requirements Document (EIRD) and Experiment Requirements Document (ERD) as we proposed. Both documents contain experiment and integration requirements and are being prepared by Martin. A problem exists in that the data in each are not always in agreement. This subject will be discussed further at NASA Headquarters during the Experiments Management Meeting next week.

CREW STATION REVIEW: There now appears to be a firm requirement to hold an integrated MDA/AM Crew Station Review in July 1969. There are some requirements which must be firmed up regarding the configuration and degree of fidelity required. Informal discussions were held between this office and MSC representatives on February 26. A meeting is scheduled for March 12, at MDAC-ED to resolve the open item.

APOLLO TELESCOPE MOUNT (ATM): We have initiated the change to incorporate the movable Mechanical Crosshairs (mechanical reticle system) in the H-Alpha Telescopes in accordance with Dr. Tousey's requirements. I have had several discussions with Dr. Tousey over the past couple of weeks and feel he is satisfied MSFC has and will interface with the PI's requirements in an objective manner. Dr. Stuhlinger and I have kept in touch on this in order to keep a unified Center posture.

ATM ACQUISITION SUN SENSOR CDR: The ATM Acquisition Sun Sensor Critical Design Review (CDR) was successfully completed on February 20, at Ball Brothers. The design and documentation was shown to be in good shape. The contractor was directed to proceed with fabrication of flight hardware which will be delivered in August 1969.

ATM CONTROL AND DISPLAY (C&D) VIBRATION TESTS: As part of the ATM C&D development, Martin/Bendix are building a C&D vibration unit for test purposes. The upper portion of the console has been completed and is currently undergoing tests. The total console will be completed and in test late next month. We expect the tests to determine if certain components on the face of the console will have to be isolated to reduce vibration levels.

F-1 ENGINE - During premodification and checkout of engine 6081 at MAF, approximately 3cc of hydro-carbon fluid was found in the fuel overboard drain line. In order to assure that no fuel had gone past the intermediate turbopump seal, the intermediate seal purge was turned on and samples of the GN_2 from the LOX overboard drain line were taken. Analysis of the samples indicated a hydro-carbon content of approximately 40 parts per million (ppm). Since this is the first time such a test has been conducted, we are not sure how to interpret the results. Consequently, two other engines, 6077 and 6081, were tested in a similar manner. These samples had hydro-carbon content of over 40 ppm and 11 ppm, respectively. Investigations are continuing at Michoud and Rocketdyne to determine if this is a normal condition.

At the request of the S-IC Office, engine system testing of S-IC servoactuators has been initiated at RETS on a priority basis. These tests are a part of the formal qualification program for changes which removed all stress corrosion susceptible material from the Moog and the Hydraulic Research servoactuators. Testing on two actuators from each vendor is scheduled for completion by May 1, 1969. This testing is being accomplished within the frame-work of the existing Operational and Flight Support Program at no additional cost.

J-2 ENGINE - On February 20, a J-2 LOX pump test on MSFC's "Bobtail" stand was prematurely terminated when an abnormal condition was detected by a bearing temperature cutoff measure-ment. This test was a pulsing test in support of the AS-503 oscillation investigation. Pressure pulses were being induced by opening and closing a bleed valve in the inlet duct at 4 to 20 cps while the pump was driven by a slave gas generator. Disassembly of the pump revealed a failure of the thrust bearing inner race. This permitted the entire turbine wheel, pump shaft, impeller and inducer assembly to move upward approximately 3/8 inch, causing the turbine wheel to rub against the shaft seal retainer nut and the turbine nozzle assembly. The failure analysis has not yet established the cause of the failure; however, it is not attributed to the pulse testing as the induced loads and accumulated duration were well below previously experienced levels. Materials analysis at MSFC did not detect any material flaws in the bearing race. The "wear ring" on the discharge side of the impeller had excessive clearance. Consequently, excessive axial force may have been applied to the back side of the impeller, thus overloading the bearing. Inspection records are being checked to determine if the excessive clearance existed because of hardware tolerance variations or if it resulted from the failure itself.

NOTES 3-3-69 Downey

B 3/5

1. G-1 SOIL MECHANICS INVESTIGATIONS: The Science and Applications Directorate of MSC has submitted to the Lunar Exploration Office, NASA Headquarters, an Implementation Plan covering the soil mechanics investigations to be performed during the first (G-1) lunar landing mission. The plan indicates a soil mechanics science team with Dr. Costes (MSFC/SSL) as team leader, and Professor J. K. Mitchell (University of California, Berkeley), Dr. W. D. Carrier (MSC), and Professor R. F. Scott (California Institute of Technology) as members.

2. CONTAMINATION EXPERIMENTS: A Crew Review Meeting covering the contamination experiments T-027 (sample array and photometer - MSFC) and T-025 (coronagraph - MSC) was held at McDonnell on February 20. These experiments are scheduled for the AAP-2 mission. The review went very smoothly. Astronaut McCandless provided comments on handling and operation of the experiments.

The Apollo Applications Program Office has requested us to investigate incorporating certain other experiments as a part of T-027. Martin, the contractor on T-027, was asked to do a two-week study to investigate the impact of adding S-063 (airglow experiment), S-073 (gegenschein-zodiacal light experiment) and S-149 (micro-meteoroid experiment) to the T-027 hardware and operations. The results of this two-week effort were presented to Dr. Lundholm of the AAP office in MSF. He appeared to be quite impressed with the approaches presented. However, in order to meet T-027 schedules, the price tag is quite high--on the order of $900,000. We have been asked to project quarterly funding requirements for Dr. Lundholm, nonetheless. Should any changes be directed for T-027, it will be highly desirable, if not essential, to conduct the qualification test program at Martin. The sample array can be qualified here, as planned.

3. SUPPORT FOR ATM EXPERIMENT S-052: At the request of Dr. Gordon Newkirk, the polarizer element for the High Altitude Observatory ATM experiment was thermally and vacuum tested at 150°C for 24 hours. Optical properties proved satisfactory both before and after testing.

NOTES 3/3/69 GEISSLER

B 3/5

1. Uneven Mixture Ratio in the Combustion Chambers of AAP's LM Control Engines (R-4D): Recent measurements by MSC in the jet of the R-4D engine revealed considerable differences between calculated and measured pitot pressure profiles. We believe the differences come from an uneven fuel/oxidizer ratio across the combustion chamber; in fact, we could make the profiles match by playing with the mixture ratio distribution. The uneven mixture is presumably caused by the coarse injector design with its few orifices, and by the fuel film cooling of the chamber walls. The discovery has two implications: (a) Our calculated jet plumes (for impingement forces, heating, and contamination) become less trustworthy, unless we can incorporate an empirical mixture ratio correction. (b) Model experiments like the recent "Grumman Shock Tunnel Tests" become somewhat questionable as sources of design data, unless the model simulates also this mixture ratio profile. Grumman's test approach uses premixed fuel and oxidizer, and has thus no chance to achieve this. Our test approach, an extension of our Short Duration Base Heating Method, uses separate fuel and oxidizer tubes and has thus a chance. ✓

2. Presentation on Ground Wind Research Efforts: Dr. H. Panofsky, Penn State University, and Dr. G. McVehil, Cornell Aeronautical Laboratory, presented the results of their research work on Cape Kennedy ground winds to representatives of AERO, ASTRONAUTICS, ASTRIONICS, and other laboratories. Attendees were also from AMC and local contractors. Their work is sponsored by our Aerospace Environment Division under the direction of Mr. G. Fichtl who also presented some results of his research on spectral nature of turbulence. Dr. Panofsky is an international authority on atmospheric turbulence and feels we have an excellent research program plan and that our tower facility at KSC is one of the best in the world. The research results to date have contributed significantly to recent improvements in our description of ground winds for use in the various engineering studies of MSFC and other agencies. Some previous notions of the scientific community on the structure of turbulence in the lower boundary layer are being restudied as a result of our research efforts. Our team approach, which includes in-house research in conjunction with appropriate university and industrial groups, appears to provide optimum results and support of MSFC's engineering interests. ✓

3. AS-503 Spacecraft Separation: During the Apollo 8 mission there was a problem with the normal CSM evasive maneuver not giving adequate separation from the S-IVB. Originally, there was speculation from MSC that there was some impulse from the S-IVB causing the problem. Preliminary analysis by MSC now indicates that the problem was caused by an incorrect spacecraft attitude during a "null" burn which was to cancel out the separation velocity and allow station keeping with the S-IVB. The spacecraft was at a 140 deg pitch attitude instead of the planned 180 deg. The reason for the error is not known. The subsequent evasive maneuver then put the spacecraft back essentially in line with the S-IVB instead of off to the side as intended. The unscheduled second evasive maneuver of 8 fps later moved the spacecraft safely away from the S-IVB. ✓

Ac

NOTES 3-3-69 GRAU

B 3/5

1. MAR QUALITY ASSURANCE AUDIT: The debriefing for the quality assurance audit which OMSF (MAR) ran at MSFC and the field sites from November 1968 through January 1969, was held February 19, 1969, in the presence of Mr. George White (MAR) and Dr. Rees. The presentation was made by Mr. George Eriksen (George White's deputy who was chairman of the audit). Of the approximately 60 findings and 20 observations (a finding being a discrepancy, and an observation a suggestion or recommendation) we have closed to date 30 findings and 18 observations. Since a sizeable quantity of the findings requiring corrective action, predominately in the documentation and procedure area, have already been worked on for some time, I expect to have closed most of the remaining items by July 1, 1969. The main exception will be preparation and publication of an overall MSFC Quality and Reliability Assurance plan for which, due to the required coordination, September 1969 has been established as the target date. A final count can only be given after receipt of the official audit report. To the credit of the chairman and his audit team, I would like to mention that the audit was conducted in a fair, impartial, and constructive manner. The cooperation of all parties involved in MSFC, under the chairmanship of Jewel Moody who was the MSFC point of contact, was excellent and made it possible to conduct the MSFC portion of the audit on extremely short notice and to make good progress in the disposition of action items.

2. SATURN V ESE: Fabrication of the Saturn V operational display system switching network hardware is complete, and we have terminated TDY coverage at Sanders, Manchester, New Hampshire, after five and one-half weeks.

NOTES 3/3/69 HAEUSSERMANN

B 3/5

1. Redshift Relativity Program. Reference Notes 2/24/69 Haeussermann. The future of the Redshift Relativity Experiment was discussed on February 27 at OSSA. Attendees from OSSA: Naugle, H. Smith, Mitchell, Roman, Ott; from MSFC: Decher, Gregory. Development of the spacecraft hydrogen maser clock at Smithsonian Astrophysical Observatory (SAO) will be supported by OSSA with SRT funds until a final decision concerning the flight experiment is made. A proposal for a hydrogen maser satellite with several scientific objectives (in addition to a redshift measurement) will be submitted by SAO in about six months. This proposal will provide the basis for a decision concerning the future of the Redshift Experiment.

2. Supporting Research. Preliminary guidelines from OART indicate that MSFC will not receive any SRT funds in the areas of Control Systems and Communications. Instead, increased funding was provided for telescope technology and optical communication and tracking. While we are very pleased about the OART support in optical technology, we are very much concerned about excluding MSFC completely from the SRT Programs for control systems and microwave communication.

Shall I
So am I.
Any
suggestions?
B

3. Goddard X-ray Telescope. Extensive computerized ray traces have been performed on the Goddard X-ray telescope (SO56). Ray traces for a point source response have been completed and ray traces for line sources and extended sources are underway. Elaborate measuring and testing of SO56 flight hardware are also underway. These tests consist of making photographs of Air Force resolution charts with the SO56 telescope. This is accomplished in the optical region of the spectrum by projecting the image of the resolution chart by means of a collimator thus illuminating the SO56 optics. The photographs are processed by means of a precision microdensitometer in order to quantitatively determine the resolution and image quality. These measurements are being performed both on axis and off axis. The off axis samples range over the total field of view and will allow experimental determination of the total image quality. The experimental results will be compared to the theoretical results of the ray trace to determine the extent of image degradation from aberrations. This work is being accomplished by in-house personnel from the Astrionics Laboratory.

NOTES 3-3-69 HEIMBURG

B 3/

1. FLIGHT CREW INPUTS INTO MSFC AAP DESIGN: The formal method for astronaut inputs into design is by letter between the center program offices or by RIDs (Review Item Discrepancies) during formal reviews. More important and efficient is the informal exchange between our Human Factors people and the flight crew. An example is the implementation of some of the Apollo 7 crew experiences into AAP-2 hardware. P&VE has modified OWS/MDA Manned Systems Design Requirements to reflect the flight crew comments on the AAP-2 mockup. Additionally, the flight crew participated informally with P&VE in the recent review of the Douglas proposals. We would like to emphasize the importance of these informal astronaut reviews to us, and our Program Management should support wherever possible our requests for joint Human Factor personnel/astronaut technical fact-finding sessions here and at the contractors' plants.

K.H. But I suggest you protect your hide lest MSC take over grounds our flight hardware! B

2. OWS MATERIALS CONTROL: McDonnell Douglas Company (MDC) currently plans to use electrical wire insulation that is flammable per MSFC-SPEC-101. Discussions with MDC Material and Process personnel indicate that no additional testing, material selection, or protective measures are planned because there is "no contractual requirement for such tests." Apparently, the materials control requirements are not filtering down to the appropriate people since the vast majority of drawings reviewed continue to have flammable and stress corrosion susceptible materials in the design of new components.

Dieter Grau Please straighten this out with Belew's office and Karl B

3. SCHNEIDER/HUMPHREYS MEETING ON BIOMEDICAL EXPERIMENTS: On 2-25-69 Bill Schneider and General Humphreys held a meeting here at MSFC on the Biomedical Experiments. Bob Thompson and a few MSC AAP Office personnel attended, as did Dr. Berry and Dr. Armstrong. MSFC key personnel were present. Of primary concern was the pace of biomedical experiments development when compared with the ML-15 schedule. Special attention was focused on the MDA FFF (Form, Fit and Function) requirement at St. Louis in May of 1970, and on SACTO Equipment Verification Test in September of 1970. There appeared to be some reconsideration possible on these two requirements, and a decision will be made in about two months.

4. S-II-7 INSULATION: As reported in our notes of last week, IO agreed to a 21-day extension in the S-II-7 delivery to do the extensive insulation rework required by failure of the feed line cavity spray foam and the cork insulation. Apparently because of current schedule constraints, North American Rockwell (NR) was permitted to proceed with the installation of the cork insulation while the stage is still in the test stand. Because of the inability to control the environmental conditions, we do not concur in any major insulation work (differentiated from routine repairs) being done on test stands; the initial S-II-7 insulation failures were attributed by both ourselves and NR to exactly the aforementioned problem.

Lee James I guess Karl is right B

5. STEEL-TEFLON LAMINATED COMPOSITE: In a recent development, we have formed a laminated composite of steel and Teflon which appears most attractive for self-lubricated gears. The problem of adhering Teflon to steel has been overcome by filling the Teflon with graphite and copper powder and then electroplating the filled Teflon with copper. The copper is then diffusion bonded to the steel. We believe this is the first successful attempt of which we are aware to so use Teflon. The utility of such a composite has already been demonstrated in gear testing which we have done.

NOTES 3-3-69 HOELZER

B 3/5

Negative Report.

NOTES 3/3/69 JAMES

B 3/5

1. S-II POGO: The POGO presentations at KSC on February 26, 27, and March 2 cleared AS-504 for launch. Many questions remain which must be further resolved by analysis and testing. We are developing an overall plan to resolve the problem and should have the initial issue ready within a week.

2. Addition of Intertank Acoustic Measurements, S-IC-5 (Reference Geissler's notes of 8/12/68): Action is underway to install the intertank acoustic measurements. The required rework of the four S-IC measuring distributors has been accomplished and the distributors were checked out and delivered to KSC on February 28. The change is being incorporated with no schedule impact.

3. Follow-on Funding for AS-516 and Subs: Frank Rosenberg of MSF Program Control visited our office February 27 to obtain backup information related to the NASA requested increase in FY-70 funding for startup of follow-on Saturn V production (AS-516 and subs). The request to BOB was signed February 24 by Dr. Paine and included 52.0 M for long lead procurement of Saturn V vehicles 516 and subsequent. A meeting will be held within the next week or ten days between MSF and BOB to discuss the request with emphasis on the impact if the startup is delayed to FY-71.

4. Utilization of LC-39 for Saturn IB Launches: We have finalized our inputs to the KSC study on this subject. In summary, we concluded that the proposal to launch Saturn IBs from LC-39 using an elevated pedestal concept is technically feasible based on the limited amount of time available. Conclusions of the study were generally as follows:

a. Launching S-IB from a pedestal on LC-39 is technically feasible, however, the lower wind limit may compromise operational capability (indicated launch wind limits were 24 knots with the Apollo shape and 20 knots with the double nose cone, as for Orbital Workshop).

b. An extensive wind tunnel program will be necessary to establish the vehicle operational wind limits.

c. The contractor cost estimates are considered optimistic and should be scrutinized in depth.

But it would couple IB and V launch schedules! B

KSC asked that we forward our inputs on the study even though the study has been put into a "hold" status because of the Lunar Exploration Schedule study now underway for Dr. Mueller. This schedule includes no Saturn V launch gap during the AAP launch period.

1 Enc: (Dr. von Braun's cy only)
Ref. Notes

NOTES 3/3/69 JOHNSON

B 3/5

Nothing of significance to report.

NOTES 3/3/69 MAUS

B 3/5

MSFC INSTITUTIONAL PLAN

The Marshall Institutional Plan was submitted to and reviewed and accepted by General Bogart on February 25. The other field Centers (MSC & KSC) also reviewed their plans with General Bogart but requested additional time for formal submission.

Bill Lucas FYI B

MSC proposed to undertake total responsibility for the future Space Station, and Lunar Exploration programs with the exception of Saturn launch vehicles, the lunar rover and lunar drill.

To accomplish these programs, MSC proposed a constant civil service manpower level of 5,033 and a nearly constant support contractor manpower level averaging 8,900 for fiscal years 1970 through 1972. (Their civil service strength was 4,458 on February 28 and support contractor strength was approximately 9,100 on October, 1968.)

Plans for presentation to the Management Council on March 4 have been cancelled due to the Apollo 9 flight and the proposed $198 million increase in the FY-70 budget. Another meeting and presentation by the field Centers is planned but will not be scheduled until after the likelihood of a budget increase can be determined. General Bogart indicated that he will request the Centers to update their plans after the budget and Apollo/Lunar schedule changes have been firmed up.

NOTES 3/3/69 MOHLERE

Negative report.

NOTES 3/3/69 MURPHY

B 3/5

Negative report.

NOTES - 3/3/69 - NEWBY

Negative report.

B 3/5

NOTES 3/3/69 RICHARD/VREULS

No submission this week.

B 3/5

NOTES 3-3-69 SIEBEL B 3/5

MDA Structural Test Article: We are proceeding with the installation of the strain gages. We do not yet know how the proposed "fix" to beef up the lower end of the MDA will affect this effort or the delivery schedule. In any event, this article will be displayed during the Teague Visit on March 6.

Neutral Buoyancy Test Activities: Preparations were continued for the astronaut visit, now scheduled for March 4. Pressure suit check runs were made using the A5L suit and the ATM translation hardware and procedures which will be employed by the astronauts. A procedure is being developed which will eliminate the requirement to remove the helmet (Apollo helmets do not have a visor) during an emergency situation.

OWS Attitude Control System (WACS): Most tubing joints in the WACS are brazed. An induction brazing training program was completed last week. Four operators and one member of S&E-QUAL were certified.

DOD Spray Foam Application: The Air Force is investigating the methods available for the field manufacture of "Instant Shelters". The project engineers at Robins Air Force Base have requested assistance in development of a process for application of polyurethane spray foam inside an inflatable parachute cloth structure. Preliminary investigation indicates the possibility of application to the unprimed cloth surface based on peel samples available to date.

The first full scale inflated building will be erected during the week of March 3. The Robins Air Force Base engineers have requested an on-site evaluation of the structure by representatives from ME after the building is erected.

NOTES 3/3/69 SPEER

B 3/5

1. AAP Resident Contractor Support for MSC Operations: We have received word from MSC on how they envision the on-site operations support for AAP. They are requesting approximately 90 contractor personnel representing all AAP modules, systems and experiments. The support is requested in the immediate future. At a later time a very small number of MSFC personnel will be requested in addition. Drawing a parallel to KSC's contractor launch teams (although there may be some significant differences), MSC is asking for supplemental contracts under their control in the hope to get unlimited access to all data they need for mission operations timelining, operational constraints, etc. I understand that no firm commitment has been made thus far; however, the pressure is increasing and it is important that we at MSFC understand all consequences of a decision to enter into supplemental contracts. The type of on-site support requested by MSC should include adequate safeguards such as a formal inter-center agreement (similar to the one we have on Apollo) and perhaps the establishment of an effective liaison office at MSC. I have discussed my views with L. Belew and proposed a joint briefing to you soon.

P.S. Please arrange this Bonnie B

2. Apollo Launch Mission Rules: Since Apollo Launch Mission Rules (LMR) have become more standardized, KSC will issue a baseline LMR document on Apollo 10. For remaining Apollo missions, MSC and MSFC will submit only mission peculiar changes from the previous mission. However, a final KSC LMR Document will still be issued for each mission.

NOTES 3-3-69 Stuhlinger

B3/5

No submission this week.

NOTES - WILLIAMS - 3/3/69

1. SPACE STATION - The NASA approach to the Phase B Space Station Study was further defined during a three day meeting with Chuck Mathews from February 24 through February 26. A general program approach was established for an artificial "g" station with zero "g" capabilities as well as an exclusive zero "g" operation potential. These will be presented by March 14 to Center Directors and on March 17 to Dr. Paine. It is expected that this "bold" approach of an artificial "g" station with a nuclear power supply, a very sizable crew and a 10 year life span, to be supplied by a low-cost, quick turn-around, reusable logistics vehicle, will obtain general NASA acceptance and be made an integral part of any follow-on plan. In this case, a 1975 initial module is proposed that would have a crew of up to 12, would be self-sufficient, and would serve primarily as a tool for an engineering and operational assessment of zero "g" and artificial "g" operating modes. It could also be launched into polar orbit and/or become the initial operational element of the space base.

F.W. Really?? I can't quite believe that in view of Paine's and GEM's position?

We are preparing necessary material for these presentations, as well as new inputs into the Statement of Work which will be rewritten to be compatible with the above intent.

Specifically, we have been requested to define the initial 1975 "common module", to make it operationally compatible with the above summarized requirements, and to prepare an Appendix B for the Workstatement which will present to all participating contractors the NASA intent for the application of this initial module in the framework of the long range space station program.

2. LUNAR PROGRAM - We attended a meeting at MSC on February 25 of the Post Apollo Planning Working Group, which will be active until April 1969. Assigned personnel from Program Development, Science & Engineering, and Program Management attended. MSFC action is in three areas: (a) Lunar Roving Vehicle engineering and program data; (b) Saturn V performance and engineering data; and (c) Saturn V cost and schedule data. The next meeting of the group is scheduled for March 17 at MSC. Our inhouse Center team is preparing appropriate data.

We have submitted 1122's to Headquarters, MAL, for final approval. Milwitzky has promised to transmit approximately $850K to MSFC next week.

Mr. Herman Bank of JPL visited MSFC on February 25 to present several LRV concepts to MSFC personnel.

March 10, 1969

NOTES 3/10/69 BALCH

B 3/15

3/11 PS

MISSION:

S-II-7 - Transfer from the A-1 Test Stand to the Vertical Checkout Building for accomplishment of spray foam modifications is still planned for 3/15/69. Stage is still scheduled to be ready to ship to KSC on 4/11/69, but the magnitude of insulation work may cause some delay.

S-II-8 - "Power-up" was accomplished on 3/4/69. Current schedule calls for cryogenic proof pressure test on 3/28/69 and static firing on 4/8/69.

S-IC-9- Stage was removed from the test stand on 3/5/69 and shipped to Michoud on 3/7/69.

S-IC-10 - Stage is expected to arrive at MTF on 3/11/69 and to be installed in the B-2 position of the S-IC Test Stand on 3/12/69.

BOMEX - Design and fabrication of Signal Conditioning and Recording Devices (SCARD's) and Decommutation units, Job No. 1, was completed on Friday, 3/7/69.

Installation of SCARD No. 2 on the ship "Ranier" at Gulfport, Mississippi, is scheduled to start on 3/11/69. To avoid unnecessary traffic on the ship, access to the ship will be controlled by the office of Captain Howard S. Cole, BOMEX Resident Project Manager, located at the Gulfport State Dock Authority.

Pyro-T - This is the short title of the Pryotechnic Hazards Evaluation and Classification Project to be performed for the Edgewood Arsenal by contract between NASA/MTF and GE/MTSD. Negotiations on this contract have been completed, and the contract is now under legal review.

INSTALLATION:

High Pressure Industrial Water Facility - A routine maintenance check has revealed pump housing cavitational damage to two of the ten main pumps. A representative of DeLaval Manufacturing Company, the vendor, has been here to investigate the problem, and we are awaiting the vendor's recommendation as to corrective action. No program impact is expected.

NOTES 3/10/69 BELEW

3/11 9TA

B 3/15

MSFC VISIT WITH GSFC TO DISCUSS OAO: Scientific & Engineering and Program Management personnel visited Orbiting Astronomical Observatory (OAO) personnel to discuss operational experiences with the recent successful OAO flight. The OAO Mission Control Center was visited to observe typical operations, including Principal Investigators' participation in flight control. Major points of interest to the ATM were: (1) Approximately one month orbital operation was required on OAO before experiment control and overall systems functions were worked into a smooth operation. The ATM corollary is that the astronauts may need a week or more before they can successfully meet the projected timeline, necessitating major effort being expended toward development of rapid timeline adjustment capability; and (2) The OAO fault correction capability (or maintenance restrictions) in checkout or KSC operations are essentially equivalent to ATM.

Hermann Weidner
This should have a bearing on our Center position re need for continued operational involvement in AAP ("Speer issue")
B

BASELINE MEETING: A significant item from the Headquarters' Baseline Meeting held March 4 was that the Cluster TV Down Link was not approved due to cost (about 500K) and lack of substantial and firm requirements. MSC/MSFC were asked to reexamine the requirements (other than PAO type) for this subsystem.

HABITABILITY SUPPORT SYSTEM: The Habitability Support System PRR was held on March 5-6, 1969. Discussion with several of the board members indicates it was a good review. Approximately 350 Review Item Discrepancies were written, but in view of the fact that there was no prior "official" input from MSC, this is not too alarming. The significant development during the meeting was the apparent desire to simplify the requirements and the total system.

AIRLOCK MODULE MANAGEMENT MEETING: The first formal Airlock Module Management Meeting since the transfer of the Airlock Module to MSFC is scheduled for March 20. The agenda has been transmitted to MSF, KSC, MSC, and the laboratories.

CREW STATION REVIEW (CSR) REQUIREMENTS MEETING: Between March 14 and 18, MSFC project and human factors personnel and some astronauts will be in St. Louis to walk through the mockup to determine astronaut requirements for the pending Crew Station Review in July.

S-IC CHECKOUT STATION EQUIPMENT: We are working with GE and S&E-QUAL in an attempt to utilize excess equipment from the S-IC checkout station at S&E-QUAL. This equipment is not necessarily built to MSFC standards required for KSC, but it could possibly be used for in-house checkout of ATM and MDA.

B 3/15

NOTES 3-10-69 BROWN

3/11 9 PM

F-1 ENGINE - The first data review by the AS-504 FEWG (Flight Evaluation Working Group) indicated a nominal flight for F-1 engines. Two engineering data measurements were lost, but acceptable data can be interpolated from other measurements. POGO damping was effective.

(Reference 3-3-69 notes concerning hydrocarbon fluid found in the GN_2 overboard drain line of engine 6081.) The pump on engine 6081 was disassembled and swabbed and hydrocarbon as high as 52 mg. per sq. ft. of surface area was found in the LOX drain cavity area. MSFC specs allow 1 mg. per sq. ft. of surface area. Investigation of the phenomenon is continuing. We have asked Q&RA and Aero-Astrodynamics Laboratories to determine if the 1 mg. per sq. ft. specification is realistic for this specific turbopump area.

J-2 ENGINE - Available AS-504 data is inadequate for use in determining the cause of the J-2 engine thrust decay during the third burn experiment on the S-IVB stage. The data, recorded at 1 sample/second will not establish an accurate sequence of events and contains several contradictions. The 120 sps data recorded on Guam was released a few days ago and conclusive answers should be available this week. Analysis of data from the first two J-2 engine operations on the S-IVB stage has not disclosed any problems.

NOTES CONSTAN 3/10/69

3/11 9:15

B 3/15

Manned Space Flight Subcommittee Visit

On March 7, 1969, for briefing by Chrysler Corporation Space Division and Launch Vehicle Branch of The Boeing Company, the following personnel were in attendance:

Congressman Teague, Texas; Fuqua, Florida; Winn, Kansas; Podell, New York; Price, Texas; Fulton, Pennsylvania; Waggoner, Louisiana; Symington, Missouri, and Cabell, Texas.

Committee Staff Members, Messrs. Wilson and Gould

NASA Headquarters Representatives, Captain Freitag and Mr. Cramer ✓

Support and Loan Agreement, JSESPO

Agreement was reached with Mr. Jack Dunstan, JSESPO (Joint Surface Effect Ships Program Office), regarding the details of the support and loan agreement for use of Michoud Assembly Facility by the JSESPO contractor. ✓

B 3/15

NOTES 3-10-69 Downey

3/10 DB

1. HIGH-ENERGY PAYLOAD: Mr. Dailey of SSL met with Mr. Halpern of OSSA to discuss our work to date on the high-energy payload definition and to obtain guidance from OSSA. Mr. Halpern seemed very impressed with the work that had been accomplished in the first two weeks of the study. (We got a good head start on this definition effort because of the work previously accomplished in the high-energy portion of the ATM Follow-on Study.) The candidate X-ray, gamma-ray, and high-energy cosmic ray experiments which we selected were considered to be satisfactory for initial definition. OSSA will provide a more firm set of experiments soon. Mr. Halpern plans to visit MSFC on March 20 along with Dr. McDonald of GSFC, who is interested in the cosmic ray experiment, to discuss the study progress. OSSA has asked us to plan a meeting in April involving potential Principal Investigators. OSSA is pressing us on this definition effort; it is of high priority to them. One of the less important considerations is to select a name for the payload. Mr. Halpern has been referring to the 25,000-pound payload as "Super-Pioneer," in the absence of any other name. ✓

Any suggestions? B

2. METEOR ASTRONOMY: SSL has established a meteor observing program. We are the only NASA Center doing meteor astronomy; and the only other group in the country with an active program, to our knowledge, is the Smithsonian Astrophysical Observatory. However, SAO is making radar measurements of meteor trails, and we are making light intensity measurements. We are using two independent systems. One involves a searchlight mirror which focuses light on the photocathode of a photomultiplier tube. A spike is received when a meteor is viewed. (A negative spike occurs when a high flying bird passes over.) The other system is an image orthicon unit which displays the meteor trail on a screen. The searchlight system provides the best indication of intensity, and the image orthicon system provides the direction information, as well as intensity. At present we are able to make observations of meteors down to about the seventh magnitude. This is roughly three or four magnitudes better than one could observe with the naked eye. The significant aspect of the present work is that we now have the capability to observe from the ground trails of meteoroids which are sufficiently frequent to be of concern as a hazard to future space stations.

B.D. Can one improve this method, say, to catch down to 9th magnitude? Appears to be a very cost-effective approach. B

B 3/15

NOTES 3/10/69 GEISSLER

3/11 KS

1. AS-504 Flight: Several major problems have been identified with the AS-504 flight. Thrust chamber oscillations again occurred in the center engine of the S-II stage in a very similar manner as on AS-503 even though the LOX tank ullage pressure was significantly higher on AS-504 than AS-503. The oscillation started at about 500 seconds, after the PU step, with the amplitude peaking out at 506 seconds and decaying to zero at 530 seconds. S-II cutoff occurred at 536.2 seconds. The frequency of oscillations during this period varied between 16.9 and 18.7 Hz with a maximum amplitude in chamber pressure of 80 psi peak-to-peak compared to 55 psi on AS-503. The S-IVB third burn was also abnormal. First and second S-IVB burns appeared normal. Restart for the third burn appeared normal and the engine operated properly, except about 4 percent lower thrust than predicted, for about 100 seconds. At this time the chamber pressure dropped rapidly from about 700 to 485 psi. Also about this time the LOX bleed valve on the pump erroneously opened, bypassing some of the LOX back into the tank instead of it going into the engine. Another more gradual drop in pressure of about 100 psi occurred about 30 seconds after the first drop. The second drop seems to be associated with the main fuel valve drifting to about a 70 percent open position. Cutoff was by a sequence function (fixed time) and seemed normal. Neither the LOX nor fuel valves opened later for a scheduled propellant dump. A further anomaly occurred during the S-IVB third burn in that the vehicle oscillated significantly in the yaw plane with a frequency of about 0.3 Hz. A maximum amplitude of ± 4 deg/sec in rate was reached just before the performance drop. After this, the oscillations were essentially damped out. A short briefing was given to Mr. James and stage managers on March 5. We will not be sending out our normal 3 day TWX to NASA Headquarters since this requirement was recently deleted. An internal MSFC report will be prepared and is scheduled for completion Monday, March 10, 1969. I'd like to see it as soon as possible B E.F.

Need. BC 3/11

E.F. Suggest we arrange a comprehensive, critical review on all these events and their significance (if any) on Apollo 10 B Please coordinate with Lee James

2. Photography from Apollo 8 Mission: On Wednesday, February 19, 1969, Dr. Charles Lundquist, of the Smithsonian Astrophysical Observatory (SAO), met with Mr. O.H. Vaughn of our Aerospace Environment Division, to discuss results from SAO's preliminary analysis of the Apollo 8 Baker-Nunn Camera photographic data. As you probably will recall, this data showed the venting of TLI burn and the propellants from the S-IVB, as well as other events photographed during the Apollo 8 mission. Arrangements were also made with personnel of SSL and Astronautics so that they could see the photographic data and exchange ideas with Dr. Lundquist. We have prepared a small paper on this subject for inclusion in the Apollo 8 Science Report. We understand that similar photography of some vehicle events was obtained from SAO tracking sites in Mt. Hopkins, Arizona and Maui, Hawaii, during the Apollo 9 mission. Exact nature of this data is currently under investigation.

GHC

NOTES 3-10-69 GRAU

B 3/15

3/10 9AS

1. LM PROGRAM: The Grumman Reliability and Quality Plans have been reviewed and comments forwarded to the LM-A program manager. Both of the plans were well written and considered acceptable except for minor items. The additional requirements were delineated and it was requested they be resolved before approval of the plans. ✓

2. QUALITY SURVEY ACTIVITY: A quality and reliability survey was performed at Perkin-Elmer Corporation, Norwalk, Conn., during the week of February 24-28. The survey covered the Electro-Optical Division and their performance on contracts for the Hydrogen-Alpha Telescope and the Pointing Control System for ATM. Although hardware production and installation had not fully begun, a number of discrepancies and observations were made which dealt primarily with procedural deficiencies. ✓

3. FLIGHT CONTROL COMPUTER (FCC): The FCC recycle activity, concerned with replacement of substandard 2N2034 transistors has begun at ECI. This activity involves removal/replacement of all suspect transistors, plus a complete FCC acceptance test. Formal IBM acceptance testing will be performed at ECI on at least three FCC's, and testing surveillance will be performed by the ECI resident DCAS personnel. ✓

NOTES 3/10/69 HAEUSSERMANN

B 3/15

3/11 9 PD

1. Visit to Goddard. MSFC personnel involved in the ATM program visited Goddard last week for a technical briefing on their recent OAO launch. The prime purpose of this visit was to review the performance and operational aspects while at KSC and during the orbital operations. In an overall sense, the on-pad checkout of the OAO spacecraft is very minimal and while on the pad the OAO has essentially no maintenance capability. With respect to the orbital operations, all experiment operations are executed from ground command and are preplanned on an orbit by orbit basis and for a longer range where feasible. During orbit operations, the amount of activity of the Principal Investigators (University of Wisconsin and Smithsonian Astronomical Observatory) appears to be minimal when compared to what is presently being considered by the ATM Principal Investigators. The orbital performance of the subsystems has been close to the predicted values. ✓

B 3/15

NOTES 3-10-69 HEIMBURG

3/10/69

1. S-IC ACTUATORS: Three of the first 20 servoactuators made by Hydraulics Research to incorporate the low stress corrosion susceptible materials were found to be cracked subsequent to heat treatment. The failures are not due to stress corrosion, but are judged to have resulted from cold shuts induced during the hand forging operation.

2. S-II CENTER AND OUTBOARD ENGINE ANOMALY INVESTIGATION: Following a series of center engine anomaly investigations and tests, the S-II lox outboard suction duct testing resumed on 3-5-69. The first test was a pulse test duplicating the 5.5 mixture ratio condition at 33 and 43 psia pump inlet pressures. Two more pulse tests with the pump and two without the pump will complete the pulse test requirements for the outboard duct configuration. The week of March 10, the test facility will undergo modifications necessary to meet new requirements for lox pump shake tests with the S-II lox inboard suction duct configuration.

3. S-IVB-504 THIRD START: The third start of the S-IVB was planned as an engineering test to determine the effect of starting the J-2 engine without the normal propellant feed and pump systems prechill. Instead, the fuel system was dumped overboard using a ground controlled sequence; no remedial action was taken to prechill the lox system. Preliminary data indicates that the LH_2 prechill by overboard dump established adequate fuel NPSH for start, but that the lox system conditions resulted in an abnormal start. During mainstage, there was a loss of engine control pressure, and subsequently an abnormal reduction in propellant flowrates and engine thrust. Detailed investigations will be conducted as the data is received. The data will also provide a basis for rational operational alternatives for several potential failure modes for the J-2 prestart conditioning systems.

4. FIRST MANNED TESTS OF LBNP DEVICE: The first tests using a man in the system were run on 3-3-69, using a prototype Lower Body Negative Pressure device. These tests were carried out with the knowledge, participation and approval of the cognizant Medical Center personnel and Safety Office. Leakage at the waist seal did not seem excessive. Acquisition of complete internal temperature data was not accomplished because of an overly sensitive "chicken" or fail safe switch. The testing will resume after certain equipment changes are made, and probably both a manikin and a live test subject will be used.

5. POSSIBLE ADDITIONAL BIOINSTRUMENTATION TO BE DEVELOPED BY MSFC: One of the key elements in the use of the Lower Body Negative Pressure (LBNP) device is a transducer called a plethysmograph sensor. The man responsible for development of the flight plethysmograph we need is now resigning from NASA at MSC. We believe we will have to develop this device ourselves if the schedule is to be met.

6. THERMAL CONTROL PAINTS: We have succeeded in preparing a nonflammable in pure oxygen, lox compatible, paint which can be cured at 160°F. This solves the problem of painting the OWS insulation liner after installation of the foil liner. We have kept MDC aware of our development since they had objected to our former paint which cured at 250°F. The preparation uses ordinary water based latex paint as a part of the formulation, thus cost will be most reasonable.

NOTES 3-10-69 HOELZER

3/11 TS

B 3/15

COMPUTATION LABORATORY SUPPORT FOR CODE CONVERSION:

This week we were advised that the performing activity codes would be changed for the MSFC Reorganization effective April 1, 1969. An analysis shows that approximately 200 computer programs will be affected, not including Financial Management Office systems, and implementation will require 1,000 to 1,500 manhours and approximately 100 computer hours.

The required manpower can be made available but the machine time to convert the files in the time frame described will not be available due to instability of the 1108's heavy demands for computer support in analysis of problems on 504, checkout on 505, and normal workload support.

The conversion will be accomplished as computer time becomes available but many reports may be late or in error until conversion is completed. We are investigating possible ways to minimize these difficulties, including machine time at Slidell and seeking approval for additional overtime operations on weekends.

B 3/15 noted. Bb 3/17

NOTES 3/10/69 JAMES
3/11 [illegible]

AS-504 Flight Evaluation Status Report: General Phillips requested a telecon status briefing on the AS-504 flight evaluation results for Tuesday, March 11, at 10:00 a.m. The telecon will be conducted from the Saturn V Control Center. We expect to cover the S-II oscillations and the S-IVB third burn problems. We informed General Phillips that no conclusive answers are expected by that time, but have agreed to provide a better description of the S-II and S-IVB events, and our present assessment of the significance to AS-505.

LRJ Please arrange a briefing for me on this. See also Weissler NOTES 3/10/69 B

AS-505 Processing at KSC: AS-505 rollout is scheduled to start tomorrow at 6:30 a.m. EST, five days later than the KSC scheduled date of March 6 due to the slip in launch date of AS-504. The slip in rollout is not expected to affect launch readiness. KSC has not released firm dates for the Flight Readiness Test and Countdown Demonstration Test. This will be the first use of Pad B at Launch Complex 39.

Transfer of S-IC-11 thru S-IC-15 Post Manufacturing Checkout (PMC) to MTF: Boeing has been directed to proceed with the implementation of the plan to combine PMC requirements with pre-static firing checkout requirements and perform most of those tests at MTF on the static firing stand. This transfer has been under review for some time as well as the performance of post static checkout at MTF. The decision was made at this time due to the safety of the operations in the Stage Test Building 420, Michoud, being jeopardized by the settling of the building floor. This transfer will free this area for repair of the floor. The plan being implemented will provide a certification that the stage is complete prior to transfer to the static test site and will provide an estimated cost savings of $400,000.

The decision was coordinated with the Quality and Reliability Laboratory, and although they prefer to continue PMC at Michoud, they can provide the necessary technical support.

S-IC Servo Actuators: Three body forgings for the new actuators manufactured from non-susceptible stress corrosion material have developed cracks. These cracks were discovered during rough machinery operations. Investigations are now in process. Forging processing is suspected as being the cause. This jeopardizes the availability of the new actuators for S-IC-7, but flight worthy actuators of the original material are available.

NOTES 3/10/69 JOHNSON

3/11 9:25

B 3/15

Experimental Rocket Engineering, Code 731, FY-68 Funds - Headquarters (OART) withdrew $400k of subject authority on March 4. It is understood that these funds are needed by Langley Research Center to cover an emergency situation in connection with computer requirements. In order to make the $400k available as requested, some '68 activities not yet under contract have been recoded to FY-69. The FY-69 - 731 authority uncommitted this date is $380k.

OMSF Presentation - In response to the ground work by and under the guidance of Mr. Chase, a presentation to Mr. Norman Peil, OMSF, Headquarters, was held on Thursday. Members of the various Laboratories gave oral and written presentations which dealt with our most immediate requirements essential to the successful development of Low Cost Launch Vehicles and Space Station development. Based on the proposition that an undetermined amount of money could be made available this year by OMSF for essential items of study, a plan was developed which shows how several million dollars involving a wide variety of developmental study efforts would be effectively utilized. Briefly, this work would consist of Nuclear Power Development activity, Modular Astronautics Systems study, Data Management/Advanced Computer work, and a group of studies for environmental testing facilities and the development of components, materials, and structures as deemed necessary for the successful fulfillment of our program objectives.

NOTES 3/10/69 MAUS

SUMMARY OF MSFC, MSC & KSC CENTER POP 69-1C SUBMISSIONS

The following table is a comparison of the MSF POP 69-1C obligation guidelines versus the Center submissions of their respective requirements.

Shep

Author?

B

(Dollars in Millions)

	MSF Guidelines	FY-69 Δ	*Req.	MSF Guidelines	FY-70 Δ	*Req.
APOLLO						
KSC	381.9	- .4	381.5	323.7	+ .4	324.1
MSC	1,001.5	0	1,001.5	752.3	0	752.3
MSFC	575.8	+ 1.0	576.8	496.7	0	496.7
AAP						
KSC	.5	- .2	.3	15.0	- 7.4	7.6
MSC	100.0	-23.2	76.8	136.0	+82.4	218.4
MSFC	156.7	+ .1	156.8	182.1	+77.9	260.0

*Requirements

NASA POLICY INVENTORY AND ANALYSIS GROUP

Mr. Landau attended a meeting at NASA Headquarters of the NASA Policy Inventory and Analysis Group. The meeting served as an introduction to the Group's mission and activities to date. Center representatives were asked to develop information for two items, to be discussed at the next meeting, tentatively scheduled for March 26, 1969. There will be a general discussion of broad policy issues, as seen by the Centers, related to survival. In addition, Center representatives were asked to develop information for a Center Policy Profile, for discussion purposes including such items as:

Is this really a worthwhile project??

B

1. Program Management
2. Institutional Management
3. Functional Management
4. Working Relationships

Further guidelines for the Center Policy Profile are to be provided by NASA Headquarters Policy Office.

SENATOR PASTORE (D-R.I.) HEADS INDEPENDENT OFFICES SUBCOMMITTEE

Senator Magnuson (D-Wash.) has given up his Appropriations Subcommittee Chairmanship to Pastore and has accepted Chairmanship of the Appropriations Subcommittee on Labor and HEW. This was done to insure that the latter committee is chaired by a liberal. P strikes me as a very sharp, but somewhat opinionated man. B

B 3/15

NOTES 3/10/69 MOHLERE

3/11 SS

Negative report.

NOTES 3/10/69 MURPHY

3/14 9PM

B 3/15

Negative report.

NOTES - 3/10/69 - NEWBY

3/11 SCS

B 3/15

ATM CLEAN ROOM:

Headquarters is giving us authority to proceed with advertising the 4755 ATM clean room and with designing the modification of an area in 4708 to accommodate installation of the ACE. Full approval of the combined 4708 clean room and ACE area project will await clearance with Congressional Committee and allocation of funds by Headquarters. We expect these actions within the next 30 days. ✓

TRAINING AT RCAA FACILITY:

Contract NAS8-21566 has been awarded to Rocket City Astronomical Association, Inc., for two educational courses entitled "Astronomy for Engineers and Scientists." Thirty MSFC personnel will attend each course to be presented at the contractor's observatory located on Monte Sano Mountain. The first course started March 5, 1969. ✓

MSFC'S PROGRAM HISTORY OF PROJECT SATURN:

Dr. Barton C. Hacker of the University of Houston, Senior Contract Historian for NASA's Manned Spacecraft Center, has orally accepted an offer from the University of Alabama at Huntsville to serve as Chief Historian for MSFC's Program History of Project Saturn, under Contract NAS8-21321. Formal confirmation of Dr. Hacker's acceptance is expected in the immediate future. ✓

Dave N.

I hope Hacker is not a completely brainwashed MSC historian who views the spacecraft as a Lady Godiva and the launch vehicle as her horse!

B.

NOTES 3/10/69 RICHARD/VREULS

3/11 9PS

B 3/15

No submission this week.

B 3/15

NOTES 3-10-69 SIEBEL
3/11 9:15

1. Neutral Buoyancy Activities: On March 4, 1969, we achieved a goal toward which many people at MSFC have been working for more than one and one-half years: astronauts participated in full pressure suit test operations in the Neutral Buoyancy Simulator. Astronauts Weitz and Kerwin performed an evaluation of two concepts for ATM translation and film retrieval while Astronaut Gibson was an observer in scuba gear. In a debriefing following each run, comments were obtained from participating personnel and observers. After proper evaluation, as many hardware changes as possible will be accomplished prior to the next scheduled astronaut visit on March 19 and 20. Every procedure, system, and subsystem performed as intended and MSC personnel commented that "It was a real pleasure to have been here and participated in the tests".

2. Engine Covers - S-IC Stages: MTF has been having problems with the stage rear cover from the standpoint of hard to handle and install, damage by wind tearing, etc. ME Laboratory was contacted to see if MSFC could help in obtaining five individual covers to cover the engines which would replace the one large rear cover. This effort was coordinated within MSFC, and PM has given us the go-ahead to make one set of covers. Work is already in process to supply one set of covers to MTF for use on the next S-IC stage to come out of the static test stand.

M.S. Has this change been approved by the Configuration Control Board? B

3. Testing of Cryoformed Prototype S-IC Helium Bottles: The contractor reported that they have completed their program in testing cryogenically stretch-formed 301 stainless steel bottles. All three bottles successfully passed the qualification tests set by cognizant Astronautics personnel. The manufacturing art has been certified by these tests. These bottles potentially weigh from 1600 to 2200 pounds less per S-IC stage than the current 2014-T6 helium bottles.

4. Gravity Substitute Workbench: The results of the flammability test on the proposed motor for the aerodynamic workbench have been received. Other than some relatively minor changes that were recommended, it was considered to be satisfactory for flight in the S-IVB workshop. On the basis of these results, the Vehicle Systems Division (S&E-ASTN-V) gave a preliminary okay and also stated that the experiment would be presented to the Safety Panel for final approval.

NOTES 3/10/69 SPEER

B 3/15

3/10/69

1. Apollo 9 Flight Control: The Apollo 9 flight proved to be a real challenge to the L/V Flight Controllers. The L/V Flight Control Team was faced with a difficult problem when during boost a malfunction in the LVDC telemetry invalidated ground processing of important flight control data. W. Shook and J. Smith, both IBM members of our Flight Control Team, did an outstanding job of quickly identifying the "false" bit and requesting appropriate changes in the ground processing to restore useable data. The contingency situation associated with third S-IVB burn and safing was also handled very well by Bill Brady (lead MSFC Flight Controller). Jointly with the HOSC, a plan for contingency ground commanding was developed to attempt to cycle the main engine valves; to make antenna switching test; to burn to depletion the APS modules; and the re-activation of the Command and Communication System to allow GSFC to track the S-IVB/IU. This was the first mission where ground commands were required to accomplish the nominal mission (restart inhibit removal and start fuel lead). These and other commands executed during the mission totaled 29 all of which were properly transmitted from Houston and received by the L/V.

F.S. I don't understand this B

2. Apollo 9 Flight Data: We have now received most priority flight data including those from GUAM covering the third S-IVB burn anomalies. Data from Carnarvon are late; we are working on it.

B 3/15

NOTES 3-10-69 Stuhlinger

3/11 9:15

MEETING ON X-RAY TELESCOPE PROJECT: Mr. R. Halpern, OSSA, requested this Center to host a meeting on the above subject at MSFC on March 19. It will be attended by Mitchell, Roman, and Halpern from Headquarters, and by Boldt (GSFC), Novick (Columbia), Clark (MIT), and Giacconi (AS&E). Presentations by members of MSFC will include experiences with the GSFC-ATM X-ray telescope, plans for MSFC inhouse work on X-ray technology, and plans for X-ray telescope study. It is expected that this meeting will provide further information for the final formulation of a work statement for the X-ray telescope study.

NOTES - WILLIAMS - 3/10/69

B 3/15

3/11 JCS

Lunar Roving Vehicle: Headquarters has informed us that $850k has been sent to MSFC for the purpose of funding supporting development work on the LRV. Additional funds are available, and we should be receiving those in the near future. ✓

March 17, 1939

B 3/19

NOTES 3/17/69 BALCH

S-II-7 - Stage was transferred from the A-1 Test Stand to the S-II Stage Checkout and Storage Building on 3/13/69, two days earlier than previously scheduled. After completion of LH_2 tank X-rays and inspection in the horizontal position, stage will be moved to the vertical position on 3/18/69 for accomplishment of spray foam modifications. Stage is still scheduled to be ready to ship to KSC on 4/11/69. ✓

S-II-8 - Schedule still calls for cryogenic proof pressure test on 3/28/69 and static firing on 4/8/69. ✓

S-IC-10 - Stage arrived at MTF on 3/11/69 and was installed in the B-2 position of the S-IC Test Stand on 3/12/69. "Power-up" is scheduled for 3/27/69. ✓

BOMEX - Installation of the Signal Conditioning and Recording Device (SCARD) aboard the ship "Rainier" was completed on 3/11/69. The ships "Mt. Mitchell" and "Discoverer" are expected to arrive at Gulfport, Mississippi on 3/19/69. The ships "Oceanographer" and "Rockaway" are scheduled to arrive at Gulfport on 3/21/69 and 3/24/69, respectively. ✓

S-II Stage Storage Dollies - Final plans and schedules are being formulated for the design, fabrication, and assembly of two dollies for the storage of S-II stages, which is to be accomplished by modification to the GE service contract. Five excess M15 trailers have been received from the Army Ordnance Depot, Pueblo, Colorado, for use in this project, for an estimated cost saving of $31,000. ✓

University Affairs - The sustaining grants from the Office of University Affairs and also the MSFC candidate tasks have now been issued to both Louisiana State and Mississippi State Universities. ✓

NOTES 3/17/69 BELEW B 3/19

GRUMMAN REEVALUATION OF LM-A COSTS: Grumman is preparing information on a reduced cost program and indicate they are having considerable difficulty in encompassing all the program requirements into the reduced budget, but indicate that they will return on March 20, with positive and constructive suggestions. ✓

STOWAGE OF EXPENDABLES IN THE LM-A: In reviewing the latest stowage requirements for the AAP-3/4 mission, it appears that a considerable amount of supplies (food, constant-wear garments, etc.) must be carried inside the LM to resupply the cluster for the AAP-3/4 mission. The LM is able to carry most of the supplies from the weight standpoint, but sufficient volume is not available in the crew provision stowage module. Therefore, these expendables must be carried into the LM cabin and removed to the MDA prior to LM-A activation. Grumman is now studying the structural feasibility of adding a pallet in the LM crew compartment to carry these additional supplies. ✓

LM-A PLUME DEFLECTOR: Regarding Dr. Geissler's note to you of 2/24/69, we are discussing the scope and technical contents of the Plume Deflector Test Program with organizations in Science and Engineering to determine the necessity for additional tests. We are receptive to more tests, if they could be done in-house at MSFC or are of mandatory nature since AAP funds are very limited. ✓

VISIT OF ASTRONAUTS: Astronauts Gibson, Garriott, and Cunningham will be at MSFC on March 20-21, to review proposed LM/ATM EVA aid concepts. Pressure suited simulations in the neutral buoyancy simulator will be performed using both the ATM trolley system and the parallel rails concept. Except for some minor hardware modifications, the simulations will be essentially the same as those performed March 4, by Weitz, Kerwin, and Gibson. MSC plans to issue a report covering both sessions after the March 20-21 simulations are completed. ✓

MEETING OF AAP PROGRAM MANAGERS: William Schneider called a meeting of the NASA AAP Managers and their prime contractor counterparts on March 14, at Martin-Denver. The primary purpose was to get the AAP team together and explore todays' interface and interaction problems, clarify what needs to be done now and develop a plan for future contractor and NASA technical interface operations. One output of the meeting was that the contractors and MSC are clearly looking to MSFC, with strong Martin participation, to provide direction for the Apollo Applications Program in areas of systems engineering and integration, but to date, MSFC has only begun to provide the timely data and direction necessary for cluster interface and operational capability. I believe it will be necessary to switch some emphasis in the Martin contract to cover these areas while the Central Systems Engineering is getting up to speed. We will be discussing these AAP requirements with Mr. Weidner, Mr. Richard and Dr. Haeussermann. ✓

NOTES 3-17-69 BROWN

B 3/19

F-1 ENGINE - (Reference notes of 3-3-69 and 3-10-69 concerning hydrocarbon fluid found in the GN_2 overboard drain line of engine 6081.) Engine F-6077 at MAF is suspected of having excessive hydrocarbon in the pump LOX drain cavity and will be disassembled, analyzed, and cleaned before installation on S-IC-13. The overall investigation is continuing.

A review of the flight data from AS-504 indicates a reduction of pump discharge head of approximately 275 feet (out of 5000 total) at approximately 80 seconds into the flight on F-2029 (stage position 1). The anomaly is under investigation.

Modification 180 to Contract NAS8-18734 was approved by NASA Hq. on March 10, 1969. This contract modification in a cost-plus-incentive fee amount of $4,075,490, definitizes a 14-1/2 month stretchout in the F-1 engine delivery schedule caused by a reduction in the delivery rate from two engines to one engine per month. The delivery stretchout was contractually implemented to realign F-1 engine deliveries to a rate compatible with the launch schedule. The modification was forwarded to NASA Hq. for approval on January 22, 1969, pursuant to current NASA Procurement Regulations. (Negotiations were conducted in September 1968.) ✓

J-2 ENGINE - The contract for J-2 Engine Operational and Flight Support covering the period from January 1, 1969, through June 30, 1970, was handcarried to NASA Hq. on March 13, 1969, by PM personnel, who were to remain there to answer questions and expedite approval of the package. The letter contract for this effort issued January 31, 1969, expires March 31, 1969, and will have to be extended unless NASA Hq. approval of the definitive contract can be obtained in a timely manner.

Analysis of the J-2 engine third burn experiment on S-IVB-504 has been delayed by a slow return of data tapes from South Pacific tracking stations and the meager instrumentation in the engine area. The first detailed data (120 bits per second) covering the pre-start and start period was received by Rocketdyne Wednesday night via MDC. MSFC and Rocketdyne had some quick look printouts of mainstage operations on Monday, March 10. The delays in data retrieval are difficult to understand.

The instrumentation included no engine accelerometers and only two temperature measurements in the engine area, as NASA Hq. disapproved incorporating our data package last summer. The data contains several unexplained events, including a drastic drop in LOX inlet pressure, engine valve movements after start, engine helium regulator pressure drop and high (off-scale) engine area temperature. The large number of unexplained events infers the instrumentation system was damaged. The failure modes have not yet been established and the inadequate instrumentation will make it very difficult to pinpoint the cause. ✓

NOTES CONSTAN 3-17-69 B 3/19

Nothing of special significance.

B 3/19

NOTES 3-17-69 Downey

1. AIR FORCE INTEREST IN MSFC CONTAMINATION STUDIES: Captain LaMontagne of the Air Force's MOL Project visited SSL for a briefing on our activities in the optical contamination field. We discussed our flight experiments and laboratory work with him. Also, he visited with persons in Aero-Astrodynamics, Astronautics and Astrionics Laboratories, and with Dr. G. F. McDonough of Central Systems Engineering. Captain LaMontagne was able to obtain an appreciation of the interest in contamination investigations at MSFC from both the systems engineering and laboratory research standpoints. We plan to continue liaison with the Air Force on our contamination experiments. ✓

2. HYPERVELOCITY TESTS IN SUPPORT OF JPL: We have begun a second series of hypervelocity tests in conjunction with the Mariner '71 mission. With additional experience on the range, our techniques are improving. We have for the first time successfully sabot-launched spherical projectiles. A hydrogen supply of improved purity seems to have enhanced performance dramatically. With only half the powder charge we normally use, a perfect shot with a spherical projectile was launched at 9 km/sec. ✓

3. STRATOSCOPE II MEETING: Mr. Heller and Mr. Harrison of SSL accompanied Mr. Boehm to Princeton for a second thermal meeting on Stratoscope II. The Stratoscope thermal design consists of highly reflective surfaces, a flat shield above and below the telescope, and thermal blankets. A decision was made to prepare a test plan for a full-scale engineering flight to test the thermal design. This engineering flight will be accomplished prior to the next scientific flight, which is scheduled for November. ✓

(Mr. Heller is on travel today. In the future, he will prepare the SSL Notes.)

NOTES 3/17/69 GEISSLER B 3/19

1. AAP Critical Problems: Three major problems are evident in the AAP with recommended solutions expected within the next two months: (1) CSM stowage overflow, (2) non-optimum use of astronaut time on the AAP-3A mission, and (3) WACS propellant capacity vs requirements. The CSM stowage problem is associated with the parachute hung weight constraint on the CM of 13,000 lbs. (abort consideration). Volume has not been closely studied. Two solutions have been pursued: (1) SM stowage which requires redesign and EVA time, and (2) AAP-2 and AAP-4 stowage. The first was deemed undesirable by NASA Headquarters and the latter is being pursued in some detail. Approximately 1100 lbs. of overflow equipment are planned for AAP-2 and 800 lbs. for AAP-4 if volume is available. Such an off-load to AAP-2 narrows the payload margin to slightly more than 900 lbs considering closed loop PU. Open loop PU operation appears eminent and will reduce this margin by approximately 400 lbs. AAP-4 is not as critical at this time, but other factors such as additional yaw steering, etc. for launch window considerations could worsen the situation. Non-optimum use of astronaut time on the AAP-3A mission is associated with the weight and volume limit for the AAP-2 vehicle. A combination of the AAP-3A and AAP-4 missions is being studied with and without a revisit. It appears that such a combin ation without a revisit would present no major problems except possible loss of ATM experiment time, while a revisit would present what now appears an impossible stowage problem. WACS propellant capacity vs attitude timeline requirements excluding experiment pointing is marginal and is being closely reevaluated. No propellant is available for experiment pointing unless the aforementioned missions combination becomes a reality, in which case approximately 100,000 lb. sec would be available for experiment pointing and additional mission requirements. ✓

2. LM-A Plume Deflector: In Notes 2/24/69 Geissler, we stated that supplementary tests are necessary to verify that the LM-A plume deflectors are adequate to protect the ATM solar array and to define the associated performance loss on the thrusters. It now appears Grumman (GAEC) has reached the same conclusion, perhaps as a result of our probing. Tests are being planned toward the first of April, but as yet are not scheduled. GAEC has been told that we require the test plan for approval and will supply one or two observers. Further, the full scale test of the Apollo LM deflectors is scheduled for April 12-17, 1969, at MSC. We have asked and received permission to monitor these tests. Probably, a concise coordinated effort on our part will obviate any additional tests on the deflector other than those already in the General Test Plan. ✓

3. Technical Presentations: Mr. O. H. Vaughn, of our Aerospace Environment Division, recently gave a presentation on the subject "The Moon Close-up" at the Southeastern Regional Meeting of the National Speleological Society held in Huntsville on March 1, and at the regular meeting of the American Meteorological Society, on March 4. Mr. Jerome R. Redus, of our Astrodynamics and Guidance Theory Division, has been invited to present the paper "On Asking the Right Question in Optimal Control" at the local AIAA Flight Mechanics Panel on April 24. Mr. Redus has also been asked by the Joint Automatic Control Conference Steering Committee to chair a session on "Aerospace Guidance and Control Systems" at the Joint Automatic Control Conference this summer. ✓

B 3/19

NOTES 3-17-69 GRAU

No submission this week.

B 3/19

NOTES 3/17/69 HAEUSSERMANN

No submission this week.

NOTES 3-17-69 HEIMBURG

B 3/18

1. S-IC HEAT SHIELD: As a result of some M-31 insulation coming off the heat shields during the past several launches, it was determined that unexpectedly high vibration occurred during lift-off apparently due to reflections from the launch pad flame bucket. The Boeing Company has completed an extensive experimental program on both the M-31 and fiberous titanate asbestos insulation panels under the launch conditions which far exceed the initial design requirements. Even complete removal of the insulating material from portions of the honeycomb heat shield did not destroy the integrity of the heat shield; thus, complete loss of insulation down to the crushed core, which is virtually impossible, would not constitute any structural problem on future launches.

2. S-II CENTER ENGINE ANOMALY INVESTIGATION: Five tests were conducted this week with the S-II Outboard Lox Suction Line Configuration. Two were dynamic pulse tests (with lox pump operating), one was a static pulse test of the pump and suction line, one was a static pulse test of the suction line only, and the last test was at a low NPSH to investigate the pump-excited frequencies at low inlet pressure. These tests completed the pulse requirements for the outboard suction line configuration. The test facility is being modified for a new shaker system for the lox pump. The system will have the capability of vibrating the lox pump to an amplitude of 6 G's at a frequency of 15-20 Hz.

3. BIOMEDICAL EXPERIMENTS FUNDING DIFFICULTIES: Although we have been getting assurance that funding is on the way, we have now been essentially without money for five weeks, and have had to hold up on procurement of some crucial pacing items. We are investigating means of precluding such delays in the implementation of the next quarter's funding allotment.

4. BIOMEDICAL INSTRUMENTATION SAFETY HAZARD - GEMINI/APOLLO ECG: It has now been proven conclusively that the Gemini/Apollo ECG signal conditioner really is capable of shocking the user (astronauts) under certain conditions. Since we will be using a number of these units in our Bioastronautics Task Team activities, we have initiated a single point responsibility for checking the equipment upon receipt, and for logging in and keeping track of the equipment in use. A protective circuit designed at MSFC to prevent shocking was provided to MSC before Apollo VII launch, but has not been employed as yet. Headquarters has, however, now issued instructions for certain corrective measures to be taken with the existing Gemini/Apollo ECS signal conditioners.

5. WORKSHOP ATTITUDE CONTROL SYSTEMS (WACS): The first major WACS electronic component procurement request (Horizon Sensor Systems) has progressed to the point of proposal evaluation. Thirty companies were invited to propose; however, only one company responded. The contractor's cost was approximately $1 million more than our estimate made last year. There appears to be no alternative other than cutting out everything possible and trying to negotiate down. In this case, the contractor probably knows that his company has the capability to provide the component, and that any other company would require significantly more time and funding.

6. MOL PROGRAM: Captain LaMontagne of the USAF MOL Project Office visited our Materials Division for discussion about outgassing, contamination, flammability, etc., and our control of materials in AAP. We gave him considerable information and data. He indicated that a closer liaison was to be established with MSFC.

NOTES 3-17-69 HOELZER

B 3/19

MEETING ON APPLICATION OF NASA HEADQUARTER'S MANAGEMENT INFORMATION NETWORK EXTENSION (MINE):

A study is being made by Systems Development Corporation for the Systems Analysis Branch of Computation Laboratory. This study will determine the typical requirements of MSFC for a generalized data management system which allows user-oriented on-line storing, retrieving and manipulating of engineering data. These typical requirements include the extended version of the Automated System for Status Information and System Test Planning (ASSIST) for the UNIVAC 1108 computer and the cataloguing of space experiments characteristics. (ASSIST is being developed for a limited capability on the GE-235 computer in S&E-QUAL). This study is nearly finished and will result in a comparison of these requirements with the capabilities of existing government sponsored generalized time-sharing data management systems, in the functional specifications of a new design using proven concepts and techniques, and in an implementation plan for such a system at MSFC.

To explore further the capability of the generalized data management system MINE and its possible utilization for MSFC requirements, a meeting was held between personnel of the Computation Laboratory, Executive Staff, and Mr. Tuey, NASA Headquarters, Manned Space Flight Program Control Office, who is responsible for the development of MINE. The MINE system was developed by GE for NASA Headquarters.

We concluded that a further brief study of the ASSIST requirements and the design specifications of MINE should be performed to determine if MINE is feasible to be applied for the 1108 version of ASSIST. The MINE system will be available by the end of March.

NOTES 3/17/69 JAMES B 3/19

AS-504 Flight Evaluation Status: At this point, a leak in the engine compartment appears to account for the third burn anomaly. This would account for the decrease in chamber pressure as well as the actuator yaw effect. We are continuing to try and determine the S-II-4 oscillation cause. To be in a position to avoid the anomaly on future flights, a decision has been made to provide the capability to implement early center engine cutoff. The engineering and kits will be provided for S-II-5, 6, 7, and 8. The kits are being planned so that they can be installed to provide the cutoff capability but will have a disenabling capability which can be utilized as late as two to three weeks prior to launch if later information proves the cutoff unnecessary. The early cutoff will cost us approximately 600 pounds of payload which would be acceptable on the F mission but may be marginal if AS-505 is launched with the G mission. We are looking at propellant loading adjustments to reduce the payload loss.

S-II-7 Insulation: Reference Heimburg's Notes, same subject, dated 3/3/69. We agree that major spray foam insulation should not be installed under other than stable environmental conditions. We are not convinced that we cannot do a satisfactory job with the cork on the stand. North American Rockwell developed an improved procedure and provided local environmental protection for the installation. They, MTF and we agreed with the procedure. The implication that we proceeded because of schedules and against advice at the time is not correct. Some of the cork was applied on the stand to allow as much time as possible for the spray foam operation and remaining cork application in the Vertical Checkout Building. We have inspected S-II-6 cork installation and with S&E-ASTN, found it to be satisfactory. Although we think the portion of cork installed on S-II-7 on the stand is O.K., we have agreed with S&E-ASTN to inspect it like S-II-6. S-II-7 is now in the Vertical Checkout Building at MTF for spray foam applications and the installation of the remaining cork insulation.

NOTES 3/17/69 JOHNSON

B 3/19

Advanced System Development - FY-70 Program - In the FY-70 Budget presented by the Johnson Administration the Advanced System Development Program (Supporting Development) was fixed at $18.3M. Guidelines to MSFC were $7.0M; to be used principally to initiate research on subsystems, and techniques applicable to the Space Station, the Space Shuttle, and the Lunar Rover. The program currently being planned reflects the $7.0M (+20%) total and allots:

Space Station	$3.8M (+20%)
Shuttle	2.2M (+20%)
Lunar	1.0M

Based on the request for additional funds recently forwarded by Dr. Paine to the Bureau of the Budget, we were requested on Friday to plan and submit to OMSF by Noon today alternative programs at:

Space Station	$8M add-on
Shuttle	7M add-on
Lunar	0 add-on

The alternative first-draft programs submitted are:

Space Station	$10M total
Shuttle	10.5M total
Lunar	1.5M total
Total Program	$22.0M

And:

Space Station	$10M
Shuttle	17.5M
Lunar	1.5M
Total Program	$29.0M

The third program plan assumes MSFC is assigned lead center responsibility for the Shuttle. Information provided Headquarters (Messrs. Hall and Lord) was marked preliminary. It is being "staffed" and refined today.

NOTES 3/17/69 MAUS 3/12

HEARINGS OF THE HOUSE SUBCOMMITTEE ON MANNED SPACE FLIGHT - On March 12, Dr. Mueller testified on the Space Station, Space Shuttle, C of F, and Resources and Program Management requests. He made a good case for both the Space Station and Space Shuttle stressing that both should be developed together and that if funding is available in FY-70, the Shuttle could be operational by 1975. Mr. Roudebush (R-Ind.) commented that the Shuttle is obviously the answer to low cost space transportation. Mr. Daddario (D-Conn.) made the observation that while the U. S. space budget for peaceful purposes has been declining, there has been an increase in other spending for space. The resultant effect appears to be that as a nation, we are being pushed into a military activity.

Mr. Roudebush commended NASA for its Apollo achievements and commented on the usefulness of space. He stated that we as a nation could benefit more if we could redirect our people from being earth-bound.

Mr. Daddario inquired as to NASA/s intent to build an Artifical "G" capability. (Dr. Mueller indicated that this was still under study.) Also, Mr. Daddario asked that NASA provide for the record, a priority listing on space station modules.

The general tenor of this hearing continued to be cordial in this session which concluded the hearings before the subcommittee.

The following are tentative schedules for further Congressional Hearings.

House Appropriations - begin April 14 (Dr. von Braun will probably be asked to appear.)
Senate Authorizations - begin during week of April 14 through 18.
Senate Appropriations - last part of April.

JOINT MSFC/MICOM TELEPHONE SERVICE STUDY - A joint recommendation for separation of the MSFC administrative telephone service from MICOM is included in the Telephone Service Study report which was completed by MSFC and MICOM and forwarded on Friday, March 14, to NASA Headquarters and the Army Materiel Command for final action. Management considerations were emphasized and cost factors were minimized in the study report and the cover letter. The study recommends that approval be given to establish a separate administrative telephone system for MSFC as soon as possible.

NOTES 3/17/69 MOHLERE

Adjunct Professors. Efforts to vitalize the long dormant concept of adjunct professorship appear to be bearing fruit. Several meetings on the subject have taken place in recent weeks. UAH has set forth a set of guidelines that are in the process of refinement after joint discussion. The matter has progressed to the point where actual nominations have been made by Dr. Scott of UAH. Faculty consideration of these nominations is currently in process. I propose to involve Chief Counsel in order to assure no vestige of conflict of interest.

NOTES 3/17/69 MURPHY

1. Review of General Dynamics Operated Radiation Test Facility: General Dynamics (Forth Worth) has a current contract with S&E-ASTN to evaluate:

a. The combined environment effect of radiation, cryotemperature, and acoustic vibration on organic materials used in insulation, valves and transducers.

b. The effect of high-intensity nuclear radiation on the thermodynamic state of liquid hydrogen propellant.

The test facility is Air Force owned and located in Forth Worth, Texas. This facility consists of the reactor, the 5400-gallon capacity RIFT model tank, radiation shielding, and other associated test hardware. The test program is expected to start in early fall 1969.

The Air Force feels that the test operations present potential radiation and LH_2 safety hazards and wants the facility moved. To relocate this facility will cost 1 to 2 million dollars, plus considerable program delay. NASA Headquarters does not believe the operations will present any radiation hazards and is presently conducting additional analyses to further substantiate this position. S&E-ASTN is providing the analysis on the liquid hydrogen propellant hazards. We are working with them and will review the facility systems and the operating procedures for LH_2 at Forth Worth, Texas on March 26-28, 1969.

2. Change Proposal on Re-routing S-II Stage Engine Cutoff Sensor Drain Lines: The change in insulation on the S-II Stage (S-II-8 and subs) has necessitated re-routing of the engine cutoff (ECO) sensor drain line. S&E-ASTN has prepared an Engineering Change to route the line to the LH_2 feed line fairing for disposal, thus eliminating associated GSE.

NAR has proposed a change which would manifold the lines into a common overboard and retain the requirement for currently used GSE.

We became involved in this change because a GH_2 leakage of approximately 50 SCIM passed the ECO sensor seal, and NAR has expressed the thought that the GH_2 could be trapped and create a hazard.

The space under the LH_2 feed line fairing is not actually purged, however, GN_2 from the interstage compartment flows under the fairing to the atmosphere providing adequate inerting for the GH_2 leakage.

We have worked with the Saturn Program Office and S&E-ASTN and concluded that the change proposed by S&E-ASTN is safe, simple and would eliminate the need for associated GSE plus the people to support it. This decision is to be made today, March 17, 1969.

NOTES - 3/17/69 - NEWBY

Negative report.

NOTES 3/17/69 RICHARD/VREULS

No submission this week.

B 3/17

NOTES 3-17-69 SIEBEL

1. Neutral Buoyancy Activities: The schedule for the next astronaut participation in the neutral buoyancy tank has been changed to March 20 and 21. Several systems and equipment modifications are being made to prepare for this visit. A tether restraining system is being developed to insure that the astronauts do not get their tethers entangled in the mockup while operating in a space suit. A heat exchanger is being placed in the space suit air supply line to maintain a confortable temperature in the space suits. The umbilical is being made neutrally buoyant so it will not affect the buoyancy of the astronaut in the space suit. Additional modifications are being made on the suit weighting system to make it compatible with an A5L suit and the mockup equipment. A new type of foot restraint is being developed to replace the dutch shoes on the ATM-LM hatch work station. This restraint should be easier to use than the dutch shoes.

2. Orbital Workshop APS System: The design of the APS modules is being modified to incorporate heaters purchased from an outside vendor. We are to furnish by July 1, 1969, a mounting panel for vendor qualification tests. The complex parts for these panels are to be made on a numerically controlled milling machine. Our capacity, even with the recent addition of a surplus machine from Rocketdyne, is not adequate to make these parts. In-house N/C machine and programming capacity is becoming a pacing item in the OWS, ATM, MDA, Solar Array, ATM camera and electrical manufacturing programs. We hope to relieve the situation by the conversion of a large machine to N/C operation and by expanding (possibly by retraining) our programming activities. In the generation of punched tapes and in the de-bugging of these, the support we have received from Computation Laboratory has always been excellent.

3. Space Manufacturing: Five people from Grumman spent a whole day in our Laboratory this week. They brought with them many ideas for space manufacturing and discussed these with us. They were brought up-to-date with our thinking and were shown the status of the experiments to be flown on AAP-2. The interest they showed and the novel ideas they had were most gratifying.

4. Aluminum Welding Course: The University of Alabama in collaboration with MSFC Training Branch plans to conduct a one-week course in aluminum welding during August of this year. C. Jackson, a professor at Ohio State University, will coordinate the activity. Our Welding Branch will furnish the welding data and will assist in selection of instructors and lecturers. The reports "Integration of NASA-Sponsored Studies on Aluminum Welding" and "Analysis of Thermal Stresses and Metal Movement During Welding" will be the basic "textbooks."

NOTES 3/17/69 SPEER

Transfer of Equipment to MSC: As previously agreed, Computation Laboratory has now transferred the original HOSC console display generating equipment to MSC. Our new system is much superior and is now considered operational. Chris Kraft is going to use the transferred equipment for ground monitoring of the ALSEP package.

NOTES 3-17-69 Stuhlinger

No submission this week.

NOTES 3/17/69 WILLIAMS B 3/19

1. Status of Procurement Actions: (a) Use of the Ben Franklin as a Space Station Analog: Contract was negotiated with Grumman on 3/11/69. We expect to have the contract signed by last week of March; (b) Nuclear Flight System Definition: D&F was signed on 3/11. RFQ will be released 3/18; (c) Lunar Roving Vehicle: Awaiting decision from Headquarters on whether we will award parallel contracts.

2. Space Station Study: We are participating in the preparation of a new "Statement of Work" for the Phase B contract. Mr. Dannenberg spent most of last week in Washington and will brief you on the status/outcome on 3/17. As you know, we are following the direction of Chuck Mathews even though he does deviate from what we feel is best. Chuck has been informed of our differences and your concerns. It is planned to review the essence of the new Statement of Work at a MSF center directors meeting in Houston on Wednesday, 3/19, and, dependent on the outcome of that meeting, schedule a meeting with the non-MSF center directors and following that have a meeting with Dr. Paine. Our current plans (desires) are to get the RFQ out by approximately May 1 and a contract signed in August '69.

3. President Nixon's Task Group (Agnew, DuBridge, Seamans, Paine): Chuck Mathews called me on Friday (3/14) and passed along the following: The first meeting of the Task Group on 3/7 went well and Dr. Paine was encouraged by the outcome. Dr. Mueller and Chuck Mathews spent Tuesday, Wednesday, and Thursday briefing the staffs of the Task Group members, and the general consensus that Chuck obtained from the meeting can be summarized as follows:

a) There was basic agreement that the Saturn V production should be continued; however, we should wait until the September 1 Task Group report is in before a production rate is selected. At any rate, we should minimize the funding requirement during the next few years as much as possible.

b) There was basic agreement that we should continue with additional lunar flights after the initial landings; however, a rate of two per year seemed adequate. We should try to minimize the funding required in the next two years.

c) As far as the Space Station and shuttle vehicle is concerned, it didn't fare as strongly as desired. There was basic agreement that they are desirable and we should proceed, however, "why can't we wait until the September 1 findings are complete" before a commitment is made. The DOD was somewhat negative on the station but finally came around to a basically neutral position. DOD also felt that the shuttle was desired but more needs to be done on "what it is" before a "commitment" is in order.

I also understand that Dr. Paine still plans to continue with his original position - i.e. press for the FY '70 supplement and the tentative commitment to the new goals.

March 24, 1969

This is the remainder of the
3/24/69 marked NOTES.

B 3/28

NOTES 3/24/69 SPEER

3/25 9 AS

AS-504 S-IVB Third Burn Data Delivery: As you know, problems were experienced by GSFC in expediting the S-IVB third burn data from Carnarvon and Guam on AS-504. Prior to the mission we had agreed to accept delivery of these key data at launch plus five days. Shortly after real time monitoring of the third burn anomaly we started our efforts through GSFC to expedite all pertinent data. The results were very disappointing due to the inflexibility of network routine data handling procedures and GSFC's determination to use common air freight. Based on this experience, we are addressing Gen. Stevenson and George Hage on the subject of expediting a minimum of key flight data to MSFC on a routine basis for each flight. In addition, we are requesting that a contingency capability be established to expedite data by courier or special aircraft from any network station if required for the analysis of flight anomalies.

NOTES 3-24-69 Stuhlinger B 3/29

3/25 9:45

1. X-RAY TELESCOPE SATELLITE STUDY: Dick Halpern from OSSA, and four potential experimenters for the X-ray satellite from MIT, Columbia, American Science and Engineering, and GSFC convened here on March 19 to discuss details of the project with representatives of PD, S&E, and AD-S. OSSA together with MSFC had considered the possibility of letting a study contract soon to define design details of a X-ray telescope satellite. However, it became obvious that the definition of the experimenters, and the requirements to be imposed upon the X-ray telescope, have not yet progressed far enough to justify a contracted study of a telescope design. Mr. Halpern decided, therefore, that details of the experiments and of telescope requirements should be studied further before a telescope design study is to be initiated.

2. ASTRONOMY MISSIONS BOARD MEETING (AMB): I attended the AMB Meeting last Friday and Saturday at MIT at the request of Jesse Mitchell of OSSA. The Board has been working on a position paper on the subject of recommended activities and priorities in space astronomy projects; individual reports from the working groups were briefly reviewed. In general, there are strong recommendations for heavy unmanned astronomy payloads, particularly for X-ray, gamma ray, and cosmic ray observations. The prospect of a "heavy Explorer program", as proposed by OSSA and presently studied at MSFC (PD), is envisoned with great enthusiasm by the Board members. The Board's attitude toward the manned space station is of the "wait and see" nature. There is a general conviction that man will play an important role in future space astronomy projects, but it is not yet understood how, and whether, the science planners can find a way to participate in the present space station planning effort. The chairman of the AMB, Dr. Goldberg, asked me to attend all future AMB meetings as an observer. It is my feeling that a briefing to OSSA by PD on the status of the space station planning would be very useful and, in fact, very advisable.

Bill Lucas FYI B

A more detailed trip report on the AMB Meeting is in preparation.

This is only a partial set of NOTES. Dr. von Braun didn't finish the set, but since he will be away for several days, asked that we send those marked pages on out.

B 3/29

NOTES 3/24/69 BALCH

3/25 SD

S-II-7 - LH_2 tank X-rays, inspection of foil seals, and tank closeout were completed, and stage was installed in the vertical position on 3/19/69 one day later than planned because of bad weather. Stage is still scheduled to be ready to ship to KSC on 4/11/69.

S-II-8 - Pre-static checkout and modifications are progressing on schedule for cryogenic proof pressure test on 3/28/69 and static firing on 4/8/69.

S-IC-10 - "Power-up" is still set for 3/27/69

BOMEX - At the request of ESSA a conference will be held at MTF on 3/27/69 and 3/28/69 for the primary purpose of appraising the several principal investigations of BOMEX status, plans, etc.

Edgewood Arsenal "Pyro-T" Project - Final distribution has been made of contract between NASA MTF and GE/MTSD for Pyrotechnic Evaluation and Classification for Edgewood Arsenal. Work requests have been approved for preparation of explosives storage and testing areas, and orientation of GE/MTSD personnel involved in the project has been conducted.

University Affairs - Louisiana State University is in final stage of preparation of next year's proposal to NASA Headquarters for continuation of their sustaining grant.

MTF Construction Claims - At the request of NASA Headquarters Facility Office, a meeting was held at MTF on 3/18/69 to review the status of outstanding construction claims being processed by the Mobile District, Corps of Engineers. Attendees included representatives from NASA Headquarters, MSFC, MTF, and the Mobile District Area Office at MTF

NOTES - BECKER - 3/24/69

3/25 B

B 3/29

LUNAR PROGRAM - A group of MSFC people attended a review of the Lunar Roving Vehicle wheel/soil interaction test program plan at Vicksburg, Miss., on March 20, 1969. A short tour of the facilities was made followed by a detailed review of the planned program.

MSFC representatives attended the Post Apollo Lunar Planning meetings at MSC on March 17 and 18. It was agreed to use LM derivatives that offered maximum payload volume (acceptable for LRV packaging) and to have LRV's in some of the mission options. This activity is concerned with vehicles through 515 (approximately to '73). Ben Milwitzky, MAL, Assistant Director, Lunar Exploration, is currently performing a lunar basing study that begins after the above time period. It encompasses derivatives of CSM's, LM's and goes out to major permanent base considerations for the late 70's/early 80's. (New buy Saturn V's are being considered with injected payload weights of approximately 113K pounds.) Uprated Saturn V configurations providing approximately 160K pounds of payload injected are being considered, starting in about '77. The Milwitzky study is to go to STAC and then the Dubridge task group within approximately two weeks.

Sid Saucier and Bill Powers spent the week in Washington providing inputs on launch vehicles, lunar logistics systems and the semi-permanent and permanent base concepts (technical and programmatic data). I spoke to Milwitzky and he is quite certain that a limited time study (approximately 3 months) will result and would like to see a team put together at MSFC to perform and support him in this study. It appears appropriate and highly desirable to establish a Task Team to accomplish this. Current trends from the Dubridge effort indicate a continuing Lunar program. Milwitzky would like to have us participate, and feels as we do that a re-establishment of MSFC participation and capability in this area is needed.

Bill Lucas

Yes, by all means B

LOW COST LAUNCH VEHICLES - The initial task team assignments are being made and personnel located together. We expect to have a matrix defining the available and open areas for all vehicles of interest by March 28, and a first task plan by April 4.

TITAN III/CENTAUR - I was told by OSSA (Norris) that it has been decided to leave the program at Lewis. You are to receive a letter in that regard.

B.L.

Is a temporary lunar base using an S IVB "Wet Workshop" on the moon included in these studies? I think it should. McElroy has a lot of detailed material on this subject to which Ben Milwitzki should be exposed! B

NOTES 3/24/69 BELEW
3/24 9TS

B 3/29

ACE/ATM INTERCENTER PLANNING MEETING: A meeting with MSC, KSC, and Headquarters has been called for March 26, at MSFC, to develop an intercenter agreement concerning ACE station acquisition, installation, software development, operations, and checkout of ATM at MSFC, MSC, and KSC. A preparatory MSFC meeting will be held March 24, to develop a coordinated MSFC posture for the intercenter meeting.

INTERCENTER GSE MANAGEMENT PLAN: A GSE management plan is being drafted for coordination with KSC and MSC. KSC is taking the lead to develop this intercenter document with appropriate inputs from MSFC and MSC.

PAYLOAD SHROUD ACCESS/EGRESS REQUIREMENTS: Preliminary drawings were submitted to KSC identifying current planned openings in the AAP-4 Payload Shroud. Our goal is to have all service and emergency access/egress openings in the Payload Shroud identified and located for the Preliminary Design Review scheduled for May.

LM-A MOCKUP REVIEW: Martin Company and MSFC personnel are attending a mockup review at Grumman this week (March 25-26). The purpose of the mockup review is to confirm changes which were made in the cabin layout as a result of the Preliminary Design Review (PDR) held in October 1968. The results of this review will essentially establish a firm cabin configuration and allow final design work to be started on the interior cabin appointments, controls and displays, stowage areas, internal lighting, color coding, visibility, and access.

INTERFACE CONTROL DOCUMENTS (ICD) STATUS: A detailed review of the status of ICD's over the past weeks has confirmed this area is far behind program needs. Preliminary Design Reviews are past for major modules and Contract End Item (CEI) specs are being negotiated, yet very few preliminary ICD's are baselined. We were reminded of this at the AAP Contractor Meeting at Denver on March 14, and here on March 20. Extraordinary effort is required and planned with the support of S&E-CSE, to get this key element of MSFC's integration responsibility on track. Priorities have been established for a series of interface meetings with MSC and appropriate contractors to verify and baseline Preliminary ICD's.

Talk to Haeussermann !! B

PROCUREMENT ACTIVITIES: The Martin Contract, 8-24000, was awarded last week (March 18) for $98.2M. This covers the Martin Systems Engineering & Integration and ATM Control & Display effort through November 30, 1972.

NOTES 3-24-69 BROWN

3/25 N

B 3/29

H-1 ENGINE - A contract for the H-1 engine logistics and support effort during the dormant period of the Saturn IB program has been negotiated, signed and approved. This new contract covers the period from February 1969 to February 1970 and provides initially for about 30 people. This number will be reduced throughout the year with only about 19 remaining on board at the end of the contract period. The contract provides for token Field Engineering at KSC, Michoud and MSFC and some maintenance of documentation at Canoga Park.

Hardware and tooling from the terminated H-1 engine production and sustaining engineering contracts are being stored in available warehouses at EAFB. The first increment of 8 engines and 20 thrust chambers has been shipped.

F-1 ENGINE - During the engine system testing being done to requalify the S-IC servoactuators, a fatigue failure occurred in the engine's actuator hydraulic supply boss. This boss is a part of the fuel high pressure duct. The duct had been exposed to only 1,025 seconds of testing when failure occurred. The failure resulted from the boss material thickness being 51% below the minimum allowed by the print (.220 inches allowable vs. .107 inches actual). The failure raises two key questions: 1) "Why was the part made incorrectly, initially?" The possibility of misinterpretation of the drawing or a tooling and/or fixture error is currently being investigated.
2) "How did the part pass through inspection undetected?"
A preliminary review of the inspection records shows that there were two or more sign-offs on this part.
Records are now being researched to determine impact on previously delivered engines. In addition, inspection techniques for the engines in the field are being evaluated.

B.B. Please keep me posted B

J-2 ENGINE - During the static firing of S-II 508, it has been proposed that the center engine be shutdown approximately 90 seconds prior to the cutoff of the other 4 engines. This experimental acceptance test is an effort to prove that the engine oscillation anomaly will be eliminated by shutting down the center engine early. Rocketdyne is opposed to this test because the risk of the engine damage is unknown. The engine will be subjected to vibrations while in an unpressurized condition and the boattail thermal environment will be more severe. As a compromise, we are investigating the possiblity of changing out the engine after the test.

GENERAL - The AS-505 Engine Program Manager's Readiness Assessment with Rocketdyne is scheduled for March 28.

The J-2 Program Review is scheduled at Rocketdyne on April 1. Because of other activities now scheduled for this period (effort on AS-504 anomalies and your visit to the West Coast), the F-1 Program Review has been postponed.

NOTES CONSTAN 3/24/69

3/25 9PD

B 3/29

Nothing of special significance to report.

NOTES 3/24/69 GEISSLER

1. AS-504 Flight Results Review: Re: Your comments on NOTES 3/10/69 GEISSLER. You suggested a comprehensive review of all significant results from the AS-504 (Apollo 9) flight and their relevance to the Apollo 10 mission. On 3/17/69, you received a status report from Astronautics Laboratory on the analysis of the two major anomalies from the AS-504 Flight (S-II oscillations and S-IVB third burn). The next Flight Evaluation Working Group (FEWG) meeting is scheduled for Tuesday, 3/25/69, and we would hope to have more answers on the above mentioned problems and any others, at this time. Pending the results of this FEWG meeting, if you desire, we could have a briefing for you towards the end of next week. I have discussed this with Mr. James. However, two additional meetings have already been scheduled in the near future; one with Mr. Hage on 3/26/69 and a telecon with Dr. Mueller on 4/7/69.

2. Aerodynamic/Acoustic Problem on AAP-2 and AAP-4 Nose Compartments: In order to provide more clearance for the payload, the noses of AAP-2 and AAP-4 were changed sometime ago to a more squat double-cone configuration essentially as the one used on SA-203. A recent cooperative Air Force/MSFC wind tunnel program on this nose shape revealed more severe aerodynamic noise than expected. This raised the internal noise beyond the tolerance level of the payload. As a remedy, the payload compartment was filled with helium, whose low density reduces the noise transfer to the payload. That helped the noise problem, but introduced instead a large uncertainty in the compartment pressure and skin panel loads. We control the compartment pressure by vent hole sizing. Our correlations of vent hole discharge coefficients and of their dependence on the external flow are valid for like gases (air discharging into air), but are questionable for unlike gases (helium/air). Helium discharge tests are required to reduce this uncertainty. An exploratory test is about to start in our 14-inch tunnel; if needed, it will be followed by a more complete test series in early summer. Use of our own tunnel cuts both cost and time.

3. AS-504 Flight Evaluation: Several new problems have just come up relative to the AS-504 flight evaluation. One involves reports from the crew that they were subjected to negative g's during S-IC/S-II separation in a more severe way than was experienced by the Apollo 8 (AS-503) crew. Flight data indicates the separation sequence was close to nominal. The F-1 engine thrust decay was faster during the later portion of the decay period on AS-504 than AS-503 as it was expected to be. This may have more strongly excited a 5 Hz structural mode that was more pronounced on AS-504 than AS-503. A relatively strong longitudinal oscillation with negative peaks was also present in the command module on AS-501. We are theorizing now that the dynamics (-0.7 g's indicated in the command module on one peak) were the cause of the sensations of the crew. The other problem involves speculation from pictures of the S-IVB taken by Baker-Nunn cameras that the S-IVB "exploded" at about 13 hours and 20 minutes to 13 hours and 28 minutes into the mission. We have nothing more on this now but expect to have to work this problem also. I-MO is working to obtain additional Baker-Nunn film to assist in this investigation.

NOTES 3/24/69 GOERNER

3/25 9:15A

B 3/29

OPTICAL TELESCOPE TECHNOLOGY WORKSHOP: Dr. Stuhlinger recently asked Mr. Blumrich, PD-DO-S, to serve as chairman for the session on structures at the Optical Telescope Technology Workshop, which will be held here April 29-May 1. The speakers for this part of the Workshop will come from Kollsman Instrument Company, Grumman Aircraft, Kitt Peak National Observatory, Goddard Space Flight Center, Langley Research Center, and two from MSFC.

IMPLEMENTATION OF ORGANIZATIONAL CHANGE: The colocated Advanced Studies Offices of Aero-Astrodynamics, Astrionics, and Propulsion and Vehicle Engineering Laboratories began their new combined operation as Program Development's Preliminary Design Office on March 17, 1969. At the present time, because of the usual problems encountered with a new organization getting into operation, a fifty-percent deficiency in required personnel strength, and the large number of work commitments, we are not yet able to operate with the desired full efficiency. We hope these difficulties can be overcome in the near future.

NOTES 3-24-69 GRAU

3/25 95

B 3/28

S-IVB, APS HELIUM LEAKS: The helium leaks which have been reported during high pressure leak tests on six of the last seven flight APS modules have been traced to the helium tank temperature boss adapter. Retorquing and replacement of the teflon O-rings was successful in only three cases. The other leaks, on Modules 507 Numbers 1 and 2 and on Spare Number 1, could only be stopped by replacing the teflon seal with Buna-N (Butgl) O-rings. Astronautics Laboratory wants the replacement of all APS high pressure teflon seals by Buna type rings. We agree, and will monitor this item during the Quality Status Meeting at MDC.

NOTES 3/24/69 HAEUSSERMANN B 3/29

3/25 9 B

OWS Horizon Sensors Procurement. The RFP's for the OWS horizon sensors were sent to 30 companies and only one (Barnes Engineering of Norwalk, Connecticut) responded. The OWS horizon sensors operate in a conical scan mode and Barnes is basically the only company which produces conical scanning sensors. In a meeting last week, we advised PM/AAP the status of this procurement action. Significant points are that the proposal was quoted at $1.6 million whereas the MSFC original estimate was $500,000 and there may be additional changes, e.g., high quality parts, which would further increase costs. Preliminary negotiations are scheduled for today. We subsequently plan to appraise Bill Davis in more detail on several aspects of this procurement action.

NOTES 3-24-69 HEIMBURG

3/29 9AB

B 3/29

1. AS-504 VEHICLE OSCILLATIONS AFTER S-IC OUTBOARD ENGINE CUTOFF: We have investigated the vehicle dynamic environment during the S-IC cutoff/S-II separation time period when the Apollo 9 crew stated that they were "jolted" and thrown forward in their couches. Our findings show that the command module did experience oscillatory forces of approximately ± 0.7 g's maximum during zero vehicle acceleration (after S-IC cutoff and prior to S-II ignition). However, this negative "g" condition was within predicted limits and has been experienced to some degree in all previous Saturn V flights in this time period (AS-501 showed the largest oscillation, ± 0.8 g's on the command module.) We have also investigated the outboard engine thrust tail-off characteristics and found the AS-504 data falls within the predicted ± 3σ limits although the thrust decay in the lower 20% of the tail-off curve is sharper for AS-504 compared to previous vehicles. There are no indications of a structural problem in the launch vehicle or spacecraft.

2. S-IC STRESS CORROSION FAILURE: We continue to experience stress corrosion failures on the S-IC stage. The most recent failure involved a bracket assembly on the S-IC thrust post. To date, approximately 30 part numbers (in some cases many components of the same part number) have failed. Our survey indicated approximately 200 part numbers were susceptible. Using the current ground rule for correcting stress corrosion problems only when there is a failure history will cause us to continue to expect additional stress corrosion failures as a function time.

Dieter Frau Shall we put up a flight to have that policy changed? B

3. S-II CENTER ENGINE ANOMALY INVESTIGATION: Reference notes of 3-13-69. Testing resumed on 3-14-69 using the newly installed shaker system, modified gas generator system and modified lox pump discharge system. Five tests were conducted this week including one dry shaker checkout, one pulse test at 4.5 mixture ratio and three shake tests. One shake test at ± 1 g, 10 to 24 Hz and three pump inlet conditions, was good and the other two were aborted due to component damage on test hardware and facility during the shaking. Testing was resumed 3-21-69.

4. S-II "A" STRUCTURE: A test program on the existing S-II "A" Structure will be run in support of the S-II flight problem of 18 cps in the aft lox bulkhead/thrust structure, center engine beam area. The test objectives are to define the aft lox bulkhead mode shapes and frequencies. Present plans are for testing to start 3-31-69; however, all test requirements have not been defined as of this date.

5. S-II EARLY CENTER ENGINE CUTOFF (CECO): The center engine of S-II-8 will be cut off at 299 seconds during the static test. The four outboard engines will burn for another 83 seconds. A water spray heat shield will protect the center engine from the radiation of the plumes of the outboard engines after CECO. The bell of the center engine will be instrumented to insure redlines are not exceeded. Based on the published engine out environment, weakening of the center engine tube braze is expected for the flight case after CECO. However, no deleterious effects are expected. In addition, measured recirculating gas temperatures measured in flight have been much lower than the published environment and lower than the braze melt temperatures.

NOTES 3-24-69 Heller

3/25 9AM

B 3/25

1. LUNAR IR ASTRONOMY: I attended a steering committee meeting in connection with our joint IR astronomy program. Each of the participating organizations has one voting member on this committee: GSFC (Soviesky), Institute for Space Studies (Jastrow), MSFC (Heller), University of Arizona (Kuiper or Johnson), and New York University (Strom). The contract for the 1.5 m IR telescope has been let to Astromechanics in Austin, Texas, by the University of Arizona. In the meeting we decided about additional general instrumentation to be purchased from already contributed funds. We are presently preparing two experiments to be carried out as part of our program consisting of a multiband photometer and an IR radiometer to be attached to the telescope. Operation is expected in late fall of this year. I would be glad to give you a briefing on it.

mailed 3/31

GH Please do B

2. HIGH-ENERGY ASTRONOMY: Two meetings were held this week with OSSA representatives and others. Dick Halpern of OSSA announced his intention of proposing to NASA a High-Energy Astronomy Program. The most interesting aspect of these meetings is that OSSA has seen fit to campaign for a broad integrated program; within it is a series of specific payload flights. There exist currently two candidate payloads: (1) the High-Energy Stellar Payload, referred to as Super Explorer, and (2) the Grazing-Incidence X-ray Telescope. This project represents a fine opportunity for SSL scientists to become involved. The two meetings were very interesting; it looks as if OSSA is moving on this program.

3. INTERFACE WITH OSSA: I initiated the release of Jim Downey to PD, pending approval by S&E. I participated in most of the above meetings on the OSSA High-Energy Astronomy Program. I was well impressed with Downey's handling of the MSFC presentations in these meetings. Many of SSL's scientists participated. In connection with this very promising OSSA program, it became quite clear to me that SSL should be strongly involved in the interface with OSSA and participate in the interface with the PI's in connection with such scientific payloads.

4. CONTAMINATION: Dr. Dozier held a meeting of the Contamination Control Board at MSC. Other members of SSL attending were: Dr. Tom Edwards, Len Yarbrough, Hoyt Weathers, Phil Tashbar and Jim Zwiener. It was agreed that MSFC would participate in the upcoming Apollo RCS engine tests in Chamber "A". Contamination samples will be prepared for these tests and will be analyzed in our laboratory after exposure to the combustion gases of the RCS. The results will apply to both the contamination problems of the thermal vacuum testing of ATM hardware in the MSC chamber and to preparation of our procedures for the sample testing of the T-027 flight experiment.

NOTES 3/24/69 HOELZER

3/25 RD

B 3/29

Negative report.

NOTES 3/21/69 HUBER

3/25 (S) B 3/29

1. Lunar Presentation to STAC (Scientific and Technical Advisory Committee):

   A presentation describing several alternative versions of lunar bases is being prepared for presentation to the STAC group on Sunday, 3-23-69. The presentation is being prepared by B. Milwitsky of the MSF Lunar Exploration Office. W. Powers and S. Saucier of Program Development have worked with Milwitsky in Washington over parts of the past two weeks, to prepare this material. MSC and Bellcomm have also participated.

   The options to be presented will range from small, temporary "bases," based upon present Saturn-Apollo hardware with relatively minor modifications, up to 12-18 man bases, of 1-2 year duration. Plans for the larger, longer duration bases include direct-flight delivery of 6-men to the lunar surface, using up-rated Saturn V's and new lunar landing stages.

2. Nuclear Flight Systems:

   An RFQ for the study "Nuclear Flight Systems Definition, Potential Flight Test and Early Operational Payloads," was released on 3-18-69. Proposals are due in 30 days. Two studies are planned, at approximately $600K each (combined OART and OSSA funding).

3. The nuclear XE engine test is currently scheduled for April 23-24, 1969. This will be the first down-fired test, and will be the first test under simulated altitude conditions.

NOTES 3/24/69 JAMES

B 3/29

3/25 9:15

1. Apollo 9 Flight Anomalies: It is obvious that a continuous effort must be made to keep management briefed and up to date on program matters such as the 504 anomalies. I have discussed this problem with Jim Shepherd and Karl Heimburg since these weekly notes are inadequate to keep you updated. You may have noticed some results of this by our efforts to have the March 26 meeting when you can attend. In addition, as tests or other conditions change, all three of us believe we should provide you occasional 30-minute briefings so you are always informed as much as possible.

Slip

Please arrange B

2. Negative Accelerations at S-IC Cutoff on Apollo 9: A review of this anomaly by the Flight Evaluation Working Group indicates that the retro rocket and separation systems operated as planned. It now appears that the most likely cause of the negative "g"s experienced in the spacecraft was a structural response to outboard engine cutoff. This takes the form of a longitudinal oscillation which damps out in about two seconds, with an amplitude of about .4 gs max. in the S-IC stage. These levels are of no concern to the launch vehicle, but the spacecraft responses are higher, about .8 gs in the CM. We are looking at two possible fixes in case they are required. The outboard engine cutoff could be staggered two and two, and the engines could be reorificed to the softer shutdown, with the present cutoff sequence. Structural analysis at MSFC and MSC will determine the necessity of a fix.

3. S-II Oscillations: Vibration testing of the "bobtailed" engine with the center engine LOX feed line is in process and is yielding valuable data. Planning is under way for the MINI A Structure Aft LOX Bulkhead Dynamic Test, and a completion date of April 14 is presently projected. These two tests will provide updated inputs to improve the math modelling of the oscillations. Planning is being finalized for S-II-8 static firing at MTF. The center engine will be cut off at the same time planned for AS-505. Special instrumentation is installed on the engine and structure, and a special cooling water spray is being installed to protect the center engine from the higher heat inputs resulting from test stand conditions. A second firing will be conducted if data review of the first test so indicates.

NOTES 3/24/69 JOHNSON

3/25 9PA

B 2/29

Video Taping of Research Achievement Reviews - The last two Research Achievement Reviews were taped with the intention of making them available to universities for seminar material. Analysis of the tapes revealed a very urgent need to improve presentation techniques. The unrehearsed persentations, while containing information of high technical value, did not demonstrate sufficient "professionalism" to be totally interest holding. Attempts to edit the tapes, to cut out the more distracting elements, were not completely successful. However, we are encouraged to continue with the idea and have scheduled a dry run of the next review. We are securing help from the staff professionals in communication to "coach" the speakers. The aim is not to produce a completely professional product, but to minimize in as far as possible the more obvious mannerisms and presentation habits which tend to distract from the technical material. If this next tape is as good as we hope it will be, we would like to run it by you for comment, complete editing and release it to Ed Mohlere for use in his work with universities. The subject of the next review is "Radiation Research." The speakers are from Space Sciences Laboratory and Astronautics Laboratory. The review is scheduled for Thursday, March 27, from 9 'til 12.

Research and Technology Plans - Some recent conversations with sub-program managers in OART appear to indicate a growing tendency to state objectives so as to be sure to cover particular individual (strong and needed) tasks without much regard to over-all, broadtermed agency needs. This is quite natural; since the "piece of research I'm personally interested in is obviously the most important piece of research in the Agency." We are not sure how much this tendency can be counteracted. Unfortunately, not being omniscient, we are also not sure how much of the tendency needs to be counteracted since the base assumption above just could be correct for any of the individual tasks. This is not an appeal for help. It is only to advise you that we no longer expect the ideal, logically coherent research program for FY-70 to result from this year's planning. But we do expect detectable improvements in coherence and relevance of the local efforts.

NOTES 3/24/69 MAUS

3/25 9A

B 3/20

NASA POLICY INVENTORY AND ANALYSIS GROUP

Reference your comment to NOTES 3/10/69 MAUS on the subject of NASA Policy Inventory and Analysis Group (copy attached). It is still too early to determine the value of this project. We will stay in contact with this effort through Mr. Landau and will keep you advised concerning the progress made.

FY-70 FUNDING FOR SATURN V FOLLOW-ON

Informally we have learned that Dr. Paine, Dr. Dubridge, and Mr. Mayo (Director, BOB) met Saturday, March 22, to discuss the FY-70 Saturn V Follow-On (516 and subsequent).

As a result of this meeting, NASA was asked to review the $52.2M FY-70 Follow-On Request to determine if and how this could be reduced. MSF is requested to reply by March 24. The MSF proposed reduction to the $52.2M will be $6M. Groundrules for the NASA reduction are:

1. Maintain our vendors
2. Maintain our prime contractor's manufacturing capability
3. Do not consider schedule impact

The rationale for the reduction is as follows:

1. Reduce the "lot size" of materials and purchased parts
2. Assuming 213/214 are cancelled, all common parts and materials already purchased would be transferred to Saturn V Follow-On
3. Reduce the level of manufacturing manpower at McDonnell Douglas

NOTES 3/24/69 MOHLERE

3/25 9:15

B 3/29

Negative report.

NOTES 3/24/69 MURPHY

3/25 JNS

B 3/29

Fire Research Program: The Office of Advanced Research and Technology (OART) has agreed to implement a long range fire research program for the Office of Manned Space Flight. This research program is divided into three general areas:

a. Fire detection and suppression systems for space vehicles

b. Flammability of materials

c. Fire suppression of hypergolics

In order to initiate this research program a meeting is scheduled to be held in Washington on March 26, 1969, to develop guidelines toward users' requirements. A representative from this office and S&E-ASTN will attend the meeting.

NOTES - 3-24-69 - NEWBY

3/25

B 3/29

NEUTRAL BUOYANCY SIMULATOR - WINDOW DISCOLORATION:

As a result of your recent questions, representatives of Facilities Office, P&VE, ME, and Safety met at the Neutral Buoyancy Tank on March 14, and made a preliminary investigation of the discolored windows. The discoloration appears to be on the outside surface of the inner glass and is concentrated in the area of the vent to air between the panes of glass. In the most discolored portholes, there also appears to be surface corrosion of the surface of the exposed steel between the panes. Further investigation by disassembly and chemical analysis is being done. You will be kept advised of the findings and corrective action being taken.

BLOODMOBILE ACTIVITY:

MSFC received honorable mention from the Red Cross for exceeding its bloodmobile quota for the month of February. We had 216 donors - 27 over our quota.

REDUCTION IN CIVIL SERVICE PERSONNEL:

We recently received a letter from Dr. Paine concerning the President's statement of the necessity to maintain Federal Government civilian employment at the minimum level compatible with the efficient conduct of operations. The Budget Bureau has requested all agencies to:

a. Reduce full-time permanent employment from month to month, and,

b. Reduce part-time and temporary employment when compared to the same month of 1968.

Dr. Paine has requested that action should be initiated immediately to review all personnel plans to assure that each employment action fully meets the criterion of need in the spirit of the President's letter. Centers which are now in excess of their planned end of year ceilings must make every effort to achieve those ceilings at the earliest possible date. As you know, Marshall's attrition is not adequate to accomplish its end of year ceiling. At a meeting with Dr. Paine last week, it was agreed that Marshall would be allowed to raise its FY 69 end of year ceiling from 5981 to 6126, or an increase of 145. No action was taken with respect to the FY 70 ceiling of 5851. If we are forced to reduce in FY 70 to 5851 means that we will be in an absolute personnel freeze until March 1970, if the reduction must be taken by attrition. I believe this subject will be discussed further in Headquarters before a final decision is made, both on a FY 70 ceiling and on the method by which we will achieve it.

NOTES 3/24/69 RICHARD/VREULS

3/25 9:15

No submission this week.

B 3/29

NOTES 3-24-69 SIEBEL

3/25 SKS

B 3/29

1. Neutral Buoyancy Activities: On March 20-21, we ran the second group of astronauts in full pressure suit simulation in the Neutral Buoyancy Simulator. Astronauts Cunningham, Garriott, and Gibson performed evaluations of the two concepts of ATM translation and film retrieval. Many of the suggestions received in the astronaut debriefings of two and one-half weeks ago were incorporated into the hardware configuration for this evaluation. Following his run, Astronaut Gibson gave a briefing at ASTN to the MSFC/MSC EVA Working Group of his impressions of the concepts currently being evaluated.

2. Space Manufacturing:

a. One of our goals in the promotion of manufacturing in space has been to interest private industry in contributing to the development of experiments. We are pleased to report that some progress has been made toward this goal. Dr. Emil W. Deeg, Chief of Ceramic Research for American Optical, has proposed a glass production experiment in a low gravity environment. The development of the experiment would be a cooperative venture between American Optical and NASA with Dr. Deeg as scientific investigator. American Optical would provide the scientific and technical effort to define the glass materials, the processing parameters, the melt containers, etc., and would assist in the performance of control experiments. NASA's contribution would be to furnish the facility and to process the samples in space. This experiment is planned for possible incorporation in the AAP-2 manufacturing experiments chamber.

b. At Dr. Debus' request, Hans Wuenscher and I gave a presentation on space manufacturing at KSC. The presentation was made in the Training Auditorium and was attended by civil service personnel, contractors, and the press. Hans Wuenscher talked on the principles of zero gravity manufacturing and I presented our plans for AAP-2 and for the future manufacturing module to be flown in conjunction with the space base.

3. Testing of Cryoformed Prototype S-IC Helium Bottles: In answer to your question,*NOTES 3-10-69 Siebel, it is not our intention even to submit the newly developed stainless steel bottles for use on the S-IC stage at this time; the program was a manufacturing technology development. The S-IC stage pressurization bottles were taken as a sample to study the potential weight savings for future applications. Hence, we have not submitted this possible change to the Configuration Control Board, nor do we intend to.

*DIR and S&E-DIR only.

NOTES 3/31/69 BECKER

4/1 NS

B 4/2

LUNAR PROGRAM

Lunar Roving Vehicle: We have been requested by Ben Milwitzky, Assistant Director Apollo Lunar Exploration, NASA Headquarters, to prepare a 1-1/2 hour presentation on the Lunar Roving Vehicle. This presentation will be given to the Lunar and Planetary Missions Board on April 7.

The two Lunar Roving Vehicle Contracts are scheduled to start the week of March 31, 1969. Each contract is for $400, 000 for an 8-month duration. Orientation meetings for these contracts are tentatively scheduled for the week of April 14, 1969.

Post Apollo Planning (Phillips/Stoney Study): The rehearsal of the final presentation (to be given at the Manned Space Flight Management Council Meeting on April 9 in Washington, D. C.) will be held at MSC on April 1. A five-hour presentation (2 p.m. - 7 p.m.) is scheduled for the Management Council. We have requested representatives from Science and Engineering (S&E) and Program Management (PM) to join us at the rehearsal in order to prepare for a briefing to you on April 7.

B 4/2

NOTES 3-31-69 Downey

4/1 8:15

(These Notes are submitted in connection with my new assignment within Program Development. Mr. Heller is now providing the SSL Notes.)

HIGH-ENERGY PAYLOAD DEFINITION: The work on the Super Explorer payload definition is progressing. Mr. Halpern, the OSSA Program Manager, seems well impressed with the work accomplished to date. Goddard is showing an increasing interest in this project, since it is obviously on a "front burner" in OSSA at the present time. (Ten persons from GSFC attended a small working meeting at MSFC on March 20.) Mr. Halpern recently announced that OSSA now considers this effort to be a joint MSFC/GSFC project. We have taken the initiative and at present have the lead. Goddard will apparently provide a program scientist function during our Phase A payload study. Three of the four recommended experiments for the payload are represented by candidate experimenters from GSFC. Dr. Lucas and I are discussing the possible MSFC/GSFC interfaces on this proposed payload.

Mr. Aucremanne of OSSA (Mr. Halpern's boss) indicates that OSSA wishes to develop the high-energy payload area as a program including several different payloads, not a single mission. The payload we are now defining would be the first of a series of high-energy payloads of increasing sophistication. We must strive to keep the first payload as simple as possible in order to assure a short development schedule and an early launch, possibly in 1973. GSFC seems amenable to the unsophisticated philosophy which we are advocating.

I have been requested to help set up a trip for Jesse Mitchell to visit MSFC to discuss this high-energy (Super Explorer) program with Dr. Lucas and others.

ASTRA: We had envisioned the optical astronomy program to evolve from OAO and ATM-A into a 40" diffraction limited, man-attended system; a 60" diffraction limited system; and then to the 120" manned space observatory. Mr. Mitchell now seems to favor extending the OAO series to include a 40" diffraction limited system (unmanned) and then to proceed directly to the 120" diffraction limited system, which might also be completely unmanned. Dr. Stuhlinger has had a recent meeting with Mr. Mitchell on ASTRA and can provide additional details, if you desire. OSSA is very apprehensive of associating astronomy payloads with the Space Station, particularly if it is to be a rotating Space Station.

B 4/8

NOTES 3/31/69. GEISSLER

4/1968

1. Saturn V Spacecraft Backup Guidance: The backup system for the launch vehicle platform implemented on AS-505 consists of two different modes: (1) automatic guidance and control, from the command module, up to escape tower jettison and (2) manual guidance and control into earth orbit, based on launch vehicle engine swivelling caused by astronaut operation of control stick, and input from IU control rate gyros. A gross assessment indicates degraded, but acceptable, performance of the automatic backup mode compared to the primary control system. Additional analysis is still necessary on the manual control mode. The conflict between manual control gains large enough to trim out misalignments and the effect of these gains on bending, slosh and loads must be resolved before the manual rate mode can be considered acceptable.

2. SA-10/Pegasus C Reentry: We have run a lifetime prediction on SA-10/Pegasus C based on orbital elements (400 x 415 km orbit) on February 26, 1969. Nominally, reentry should occur in late August with a two sigma tolerance of late June to late December.

3. Jimsphere Temperature Sensor: An article on the Jimsphere Temperature Sensor entitled "High Resolution Balloon-Borne Temperature Sensor" was published in the February 1969, issue of the Journal of Applied Meteorology. This sensor was designed and developed under the direction of Mr. Dennis Camp in our Aerospace Environment Division. As a result of the article, Mr. Vaughn D. Rockney of ESSA, requested 150 copies of the article for distribution at the World Meteorological Organization's conference on "Upper Air Instruments and Observations" to be held in Paris in September 1969.

4. Support for Astrionics Laboratory: Atmospheric rawinsonde measurements have been made in support of the sun sensor work for the ATM project. The atmospheric data were required for determining the atmospheric attenuation relative to the ATM sun sensor measurements tests. Two hygrothermographs were provided for use in connection with biomedical tests being run on the human body in a pressurized chamber. One instrument will be placed in the chamber with the test subject to monitor environmental conditions in the chamber which may affect the human body. The other instrument will be placed outside the chamber for comparative purposes.

B 4/8

NOTES 3-31-69 GOERNER

4/1 KB

OUTER PLANETS WORKING GROUP MEETING: A meeting of the Outer Planets Working Group will be held in Washington, D. C., on April 2, 1969. Mr. Ellison (PD-DO-PM) will attend and present material pertaining to Saturn V and Saturn V/NERVA capabilities on a 1977 E-J-S-P (Earth-Jupiter-Saturn-Pluto) (12-year mission) and a 1978 E-J-U-N (Earth-Jupiter-Uranus-Neptune) (12-year mission).

INFORMATION MANAGEMENT STUDY: Dr. Mueller has authorized MSC-FO to issue a sole source RFP to Mitre Corporation for the Information Management Study. The funding is $400K; however, Dr. Mueller has stipulated that he will review the work when 25% of the funds is expended. After this review he will decide whether the work will be continued according to the MSC approach or terminated. Mr. Beers, the proposed MSC COR, had informed Mr. Carlile (PD-DO-E) (the designated MSFC representative and alternate COR) by telephone that the RFP will be issued this week. Two weeks will be allowed for response and two weeks for MSC, MSFC, and OMSF to review and negotiate the final proposal. The target date for work to commence is May 1, 1969.

NOTES 3-31-69 GRAU

B 4/8

A/10A

1. SYMPOSIUM ON LONG LIFE HARDWARE FOR SPACE: The symposium which took place on March 17 - 19 in the Morris Auditorium was highly praised by many participants and attendees who stated that they received very valuable information. Attendees included NASA Headquarters (7), NASA Centers outside MSFC (25), Industry (152), Universities (3), and MSFC (244 total exposed but not attending all sessions). Since proceedings are in print and the sessions were taped, information can be made available to people who did not attend. Suggestions were forwarded to make this an annual event, perhaps rotating among NASA Centers, or to follow up every so often with seminars covering specific subjects and thus being limited in scope, time, and attendance.

2. AIRLOCK MODULE PROGRAM: Representatives from this Laboratory recently visited McDonnell-Douglas at St. Louis to evaluate the AM program. Generally, the program was found to be in good condition. MDAC has an in-house receiving functional test program and provisions for witnessing vendor acceptance tests of components which cannot practically be tested in-house because of complexity of facility problems. The MDAC philosophy very nearly coincides with that of MSFC in the component test area.

3. CO-LOCATION OF S&E-QUAL PERSONNEL: The agreement for Time-Limited Assignment of Quality and Reliability Assurance Laboratory representatives to Program Management has been signed off by concerned MSFC elements. Personnel actions are in process. Fourteen Quality and Reliability Assurance Laboratory personnel are onboard within Program Management as of March 31, 1969.

B 4/8

NOTES - 3/28/69 - HUBER

4/1 KS

1. PLANNING REVIEW COMMITTEE MEETING: As you know, Dr. Newell has called an all day meeting of the Planning Review Committee (PRC) for April 8 in Washington. The PRC is made up of the Planning Steering Group (Newell, Mathews, Nicks, Lundin, Brockett, Lilly, Eggers, Wyatt), plus the Program Office and Center Directors. It is essentially the same group that participated in the Blue Sky Meeting.

   The purpose of the meeting is to obtain Center comments and suggestions on the planning activities to date. Each Planning Panel Chairman will present a summary of his panel's work and any questions where he may need guidance. Dr. Lucas will represent MSFC. We will brief you after the meeting on the results and implications.

2. LUNAR BASE PRESENTATION TO SCIENTIFIC AND TECHNICAL ADVISORY COMMITTEE (STAC): Information on lunar base options was presented to STAC by B. Milwitsky of Capt. Scherer's Office on Sunday, 3-23-69. W. Powers and S. Saucier of PD-SA assisted in preparation of the presentation. MSFC was not represented in the STAC meeting; however, we have now received copies of the material presented. The briefing was reportedly well received.

   We expect a request to participate in follow-on lunar base studies, after Milwitsky and Scherer firm up plans with Dr. Mueller.

3. NUCLEAR ENGINE FIRING: The Nuclear XE Engine full power test has been re-scheduled to 5-1-69. First power start of XE occurred 3-20-69. Three start-up experiments were conducted to check out facility and engine response, and achieved a maximum power of 100 m.w., chamber temperature of 1200°R, and chamber pressure of 100 psia. Next test is to be an intermediate power test, scheduled for 4-3-69.

NOTES - 3/31/69 - NEWBY

4/1 KD

B 4/8

SUMMER GRADUATE & FACULTY PROGRAM:

This program, planned for a total of 75 participants, is progressing very well. Of 65 offers extended, we have had only 7 declinations which is the lowest rate since the beginning of this program.

TECHNOLOGY UTILIZATION:

According to reports, an MSFC TU demonstration is apparently the main attraction at the Midwest Industrial Design and Engineering Fair this past week at Indianapolis, Indiana. The TU exhibit and demonstration centers around the sight switch and its application to industrial activities - operating electrical tools (drills, saws, etc.).